40 Lock

POPULAR Computing WEEKLY

35p 20-26 January 1983 Vol 2 No 3

This Week

Micro chess

John White looks at the history of chess programs written for popular micros such as the ZX81, Vic20 and Spectrum. See page 12.

Jupiter Ace revisited

Martyn Sudworth looks at the Ace from a user's standpoint and presents Alien Swarm — a 1K game written in Forth. See page 22.

Spectrum draw

Nick Wilson shows how to draw thick circles using a hidden function of the draw command on page 26.

Dragon mix

David Lawrence explains how to mix text and high resolution graphics on screen. See page 25.

★STAR

Flipside on Vic20 by Shahid Butt. See

GAME★

News Desk

New look for Commodore Pets

COMMODORE gives Pets a new look and taps into Zylog chip technology as the new year gets under way.

The Pet range of microcomputers has been rationalised, following the launch of the new mid-range machine — the Commodore 64 — and the new 'top-of-the-range' machine — the Commodore 700.

Of the Pet range only the 8032 and 8096 machines will remain, and both will be repackaged in the futuristic-style housing of the 700 machine. A small number of old-style 4000 Pets will continue to [illegible] sold

Continued on page [illegible]

Spectrum in Las Vegas

TIMEX has announced its plans for the American version of the ZX Spectrum — the TS2000.

Officially launched on January 7 in Las Vegas, two versions of the TS2000 will go on sale in the second quarter of 1983 — a 16K version for £95 and a 48K version for £127.

The TS2000 is virtually identical to its British counterpart. The only differences, apart from NTSC tv compatibility, are those of styling — it is finished in brushed silver rather than black and the colour flash of the Spectrum is replaced by coloured squares.

A new printer was also launched by Timex at the CES Las Vegas show. The company has used Sinclair technology to develop a unit significantly different from the UK's ZX Printer.

Retailing for £63.50 the more bulky TS2040, while still being a dot-matrix thermal printer, produces a 32-column display on 40-column width paper. The unit will go on sale in January.

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Continued on page 28

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All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

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Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

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Editorial

Sord is a most unlikely Japanese company. Founded in 1970 by Takayoshi Shiina, with an initial capital investment of just £1,790, Sord has become one of Japan's leading microcomputer manufacturers with a multi-million pound turnover.

Most companies in Japan are either small family businesses or giant corporations like Hitachi and Sony. Traditionally, most Japanese employees expect to stay with one company for life. The way to the top is via a carefully structured promotional ladder that takes years to climb.

Takayoshi Shiina is, in Japanese terms, a maverick. Not content with establishing his own company, he has gathered together some of the top hard- and software brains in Japan. Perhaps his greatest coup was in persuading Toshiaki Kamijo, the man behind the Sony Walkman, to join Sord in November 1981.

While the practice of head-hunting is well established, both in the UK and the USA, it is virtually unknown in Japan.

Shiina's activities may not have endeared him to his fellow Japanese competitors, but they have resulted in a company that bears comparison with both Apple and Sinclair. With a PAL version of the Sord M5 micro due to be released in the UK shortly, I believe we may yet hear more of Sord.

Next Thursday

Can you escape from the green blocks that threaten to surround you? Will you reach the flashing square that could save you? Find out in Computer Surround, a new game for Spectrum by David Oxley.

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PICTURESQUE

New moves

Continued from page 1

for use in education.

The new style 8000 series machine will be available in January. The 8032 (32K) is priced at £995 plus VAT. The 8096 (96K) costs £1,195 plus VAT.

Commodore has also announced a five-year shared technology agreement with Zylog, the US chip manufacturer.

This gives Commodore access to 16- and 32-bit know-how. Zylog's Z8000 chip, which can support CP/M 86, has been used to develop a 16-bit second processor card for Commodore's new 700 machine.

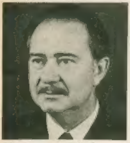
Commodore 64K portables

COMMODORE has announced a new range of portable computers based on the Commodore 64 machine.

Planned for launch in Britain in May, three versions of the new micro will be available.

The basic model, featuring 64K Ram, 5-inch screen with black and white display, and single 170K disc drive, is expected to sell for around £630.

The most advanced of the three models, with 64K Ram, 5-inch full-colour display and twin 170K disc drives, will sell for about £950.



Honours List award

ALAN BENJAMIN, Chairman of the IT '82 Committee, has been awarded an OBE in the New Year Honours List.

He is currently Communications Director for the CAP software group. He has worked extensively in the computer industry – as a founder of SPL International, as Director General of The Computing Services Association and as Director of Corporate Communication at ICL.

Sinclair and the French connection

SINCLAIR may switch production of his ZX81 and Spectrum microcomputers to France, if Timex's Dundee plant goes on strike.

Last week Timex announced that it is to cut 1,900 jobs at Dundee, mainly within its watches division. Despite a warning from the US-owned company that any labour disruption would lead to closure of the whole plant, the 4,000 Dundee workers narrowly voted in favour of strike action if any compulsory redundancies are made.

Although the planned job losses do not affect computer manufacture, any industrial action could have serious implications, and Clive Sinclair reacted sharply to news of the vote.

"If the threat of strike action is not removed in discussions between management and unions, and a full strike appears inevitable — which would affect our production — we will move our business elsewhere, probably permanently," he said on Wednesday.

"Accordingly, we have identified new sources of supply which would ensure complete continuity of production levels and enable us to guarantee supplies to all our customers."

One of the new sources of supply is thought to be Fralsen, an electronics company based in Besancon, France. Fralsen is owned by reclusive Norwegian businessman Fred Olsen — a shipping magnate who also controls Timex through a major shareholding in Nimslo, and is thus familiar with both Sinclair and his products.

Olivetti spark printer for Acorn

ACORN computers has adopted the Olivetti printer for use with its microcomputers.

The printer, called the JPIOP, uses the non-impact 'spark ink-jet' printing method. Minute particles of the carbon print rod are 'spark' transferred to the paper through a 7 x 7 dot matrix. In this way the print head has no moving parts, reducing print noise and increasing reliability.

The machine can accept either 8 or 9 inch (pin-to-pin width) plain roll or continuous paper.

The JPI bi-directional printer has a 96 ASCII character set formatted either as 80, 96 or 132 columns. Double width and double height characters are possible.

In high-resolution plotting mode the printer is dot-addressable and has a resolution of 110 × 216 pixels per inch (horizontal × vertical). Other graphics modes include reverse and zoom.

The Acorn JPIOP prints at 83 characters per second (50 lines per minute) and has a shortest-path seeking capability.

The unit comes complete with Centronics interface and 1K onboard printer buffer, priced at £395 plus VAT.

Waiting for Oric

AS Oric's hardware production hits a problem, plans of extended software for the machine have been announced.

It now seems that there will be no 32K version of the Oric 1. Difficulties in finding a suitable direct chip replacement have been blamed for the decision to shelve the mid-range machine only six weeks after it was announced.

Meanwhile further problems — particularly with the colour display (see the review, *Popular Computing Weekly*, January 13) — have delayed production of the first 16K and 48K machines as the order back-log builds up.

On the software side there is some good news. Tansoft, the software development division of Tangerine, has been contracted to produce a range of material for the Oric.

An upgraded Rom providing Extended Basic is planned. Priced at £34.50 it will give the machine commands such as *Usr*, *Proc*, *If-Then-Else* and *Do-Until*.

The Forth cassette, promised free with every 48K machine sold, should be available in February.

Also being developed is a range of games and business material. Oric Chess, Oric Lander and Zodiac (an adventure game), 3-D Noughts and Crosses and a multi-game pack (five games) are scheduled for March, priced around £6. On the business side, a Database Management program (48K) is being written, which will cost around £20.

New micro from Atari

ATARI has announced preliminary details of its new generation of microcomputers.

The first new computer is the Atari 1200XL, an upgraded Atari 800 machine with 64K Ram, expected to sell for around £575.

Software and peripherals available for the Atari 400 and 800 machines will be compatible with the new computer.

At the same time as details of the 1200XL were released in the US, the UK price of the Atari 800 machine was cut from £499.95 to £399.99.

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Dear Sir,

I received a copy of your Football Manager, Spectrum 48K game a couple of weeks ago and felt I must just write and congratulate you on such an "addictive game".

I started on the beginners skill level with Ipswich Town in the Fourth Division. After having played six seasons I am now into the first division having won the F.A. Cup whilst in the second division. All of which took about nine hours of being glued to the screen.

Since reaching the first division I have increased my skill level and am now sixth in the table after ten seasons and about 15 hours!

The reason I am suprised that I have played this game more than any other in my library over the last two weeks, is because I don't really like watching football on television. I don't even support a team. The structure of your game is such that anyone can play it.

P. A. HACKMAN,
BURY ST. EDMUNDS

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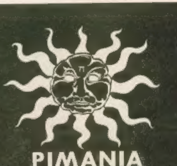

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England

Not if you don't hammer them

I have recently purchased a Vic20 and a Jellymonsters game which I find very good. However, could you please tell me if continued pressing of the same four keys, to move the gobbler, will wear these keys out? I have bought a joystick, but I find it very hard to use and slower in response than the keys.

Jane Granger
8 Limes Avenue
Elm
Nr Wisbech
Cambridgeshire

One of the advantages of the Vic20 is its full-size, typewriter style, keyboard. It should stand up to repeated key presses without much difficulty, providing you do not hammer the keys.

Programmed for retirement

I have always wondered what astronauts do after they retire from NASA. Now I know — they write programs for Spectrums and send them to *Popular Computing Weekly*.

PS *Lunar Lander* by Gordon Cooper was very good.

David Hartley
er . . . I mean Neil Armstrong
17 Towers Way
Leeds
West Yorkshire LS6 4PJ

Expanding the Dragon

Dragon users may like to try expanding their memories, at no extra cost to themselves. If you are not using Hi-res, then enter *Pclear* 1 immediately after switching on your machine. This increases the space available for data and programming by 4.5K (more than the Vic20's user available memory).

However, although this command will work if used in the first line of a program, two problems may occur:

a) The memory will only be increased after the program is Run. Thus the extra space is only available for variables and files loaded from tape or keyboard, not from the program.

b) A more serious problem is that any program which uses Hi-res commands sets the default *Pclear* 4. After this, or any other *Pclear* command, the Dragon rejects *Pclear* 1 as an error. Also, before using the "memory expanding" program, you must first switch off the Dragon if you have used a Hi-res program previously (even manual reset does not seem to work).

David Markwell
39 Chequers Park
Wye
Ashford
Kent

Linking up for good sound

While reading your November 11 issue, I read A Laird's letter about amplifying the ZX Spectrum. I tried this out on my tape cassette and it worked, albeit with a lot of interference. But, as A Laird said, "what do you want for nothing?"

I then had an idea — why not try my cassette on my Philips stack system? I tried this by making up a lead with the standard ZX jack plug and a standard Philips jack plug (the two jack plugs cost 70p and a length of two-core cable was 36p). I then soldered them together and plugged one end into the Spectrum mic socket and the other into the mic socket of my Philips stack system.

I was amazed at the sound that came out — I could have the bleeps as low as I liked or as high as my speakers are capable of, which is 40 watts per channel. There is no background noise at all. As most people have a hi-fi system, they may like to try this out.

Michael Jeal
30 Cherry Road
Shrublands Estate
Great Yarmouth
Norfolk

A bug much admired

With reference to Spectrum "bugs", I have encountered difficulties in using the *In* function to read the keyboard as suggested in the manual (page 16).

There appear to be two separate causes of the problem, the first being illustrated by the program below:

```
10 BORDER 0 : PAPER 0 : INK 7 :
   CLS
20 PRINT AT 0,0; IN 32766
30 GOTO 20
```

This should give 255 on screen with reducing values down to 239, depending on which keys are pressed in the right-half of the lower row. In fact this returns 191 with no keys pressed and appropriate reductions when keys are pressed. This suggests that bit 6 of the byte read, which indicates the state of the earphone socket, is being held at 0. Interestingly, if the Border 0 command is now deleted, the correct figure of 255 is produced. Any explanations?

The second problem appears when a program is *Saved line 1* in order to make it auto run on loading. Once again, the value of 191 is returned by the *In* function.

I telephoned Sinclair Research with a query about this problem and was told that the only reason they could think of was that my tape recorder was giving a signal at the earphone socket when not running. In pursuit of this idea I tried again and unplugged all the cassette leads after loading and, you guessed it, it still gives 191. The peculiarity of this effect is that if I break into the program then enter Run, the value returns to 255.

In case this was just a one off problem, I prevailed upon a friend to try the same thing on his machine and it behaved in exactly the same way. Has anybody an explanation of these problems or does anybody have a machine that does not produce these results? The only thing I have not tried is to run the above on a new style pcb machine as both machines tested were from the original batch requiring the plug-in board for expansion.

I would be grateful for any suggestions as I find this function much better to use than *Inkeys*, in that it will read more than one key pressed together and does not require as much error trapping.

M R Lows
20 Awelfryn
Amlwch
Gwynedd, LL68 9DG

Improvements by renumbering

I would like to thank A J Clavier (Letters, September 30) for his improvements to the Spectrum renumber program. But, I should point out that there is a misprint in his corrections — the 299 in line 9967 is really a 229.

While reading his letter, I thought that there were several other situations apart from *Goto*, *Gosub* and *Restore* that needed renumbering: namely *Run*, *List* and *Llist*, all of which can take a line number after them. If used in a program being renumbered, line 9967 should now read:

```
9967 IF PEEK I 229 OR PEEK I 240
OR PEEK I 255 OR PEEK I 247 OR
PEEK I 236 OR PEEK I 237 THEN GO
SUB 9971.
```

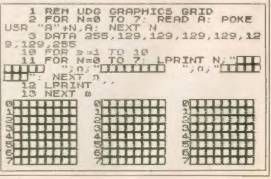
I am confident that this is the final useful improvement that can be made, until someone converts the whole program to machine code.

Bill Longley
388 Ipswich Road
Colchester
Essex CO4 4EX

Grid printing for graphics

Below is a little program for all those Spectrum owners with printers who do not know what to do with them. The routine prints out a grid for defining user-defined graphics.

Andrew Cleminson
40 Darrington Drive
Warmsworth Doncaster
South Yorkshire DN4 9LF



```
   1 REM UDG GRAPHICS GRID
   2 FOR N=0 TO 7: READ A: POKE
USR "A"+N,A: NEXT N
   3 DATA 255,129,129,129,129,12
9,129,255
  10 FOR m=1 TO 10
  11 FOR N=0 TO 7: LPRINT N;"□□□
□□□□□  ";n;"□□□□□□□□  ";n;"□□□□□
□□□": NEXT n
  12 LPRINT ''
  13 NEXT m
```

Flipside

A new game for Vic20 by Shahid Butt

Flipside is a fast moving graphics game, which requires quick reactions. You are in charge of a ball which is continually moving around the screen. Pressing the keys *Q,W,E,A,D,Z,X* and *C* changes the direction but not the speed of the ball.

The letters of the alphabet appear in random positions on the screen. You must use the control keys to guide the ball over the letter. When a letter is successfully "hit", it disappears and another letter appears elsewhere on the screen.

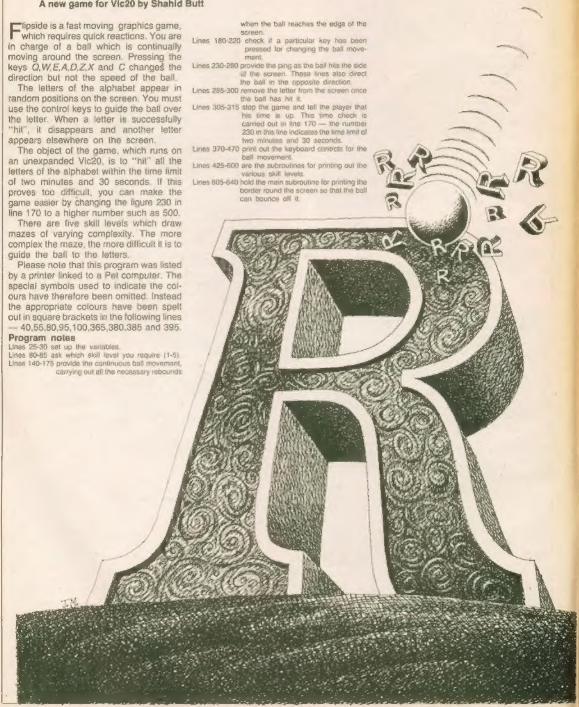
The object of the game, which runs on an unexpanded Vic20, is to "hit" all the letters of the alphabet within the time limit of two minutes and 30 seconds. If this proves too difficult, you can make the game easier by changing the figure 230 in line 170 to a higher number such as 500.

There are five skill levels which draw mazes of varying complexity. The more complex the maze, the more difficult it is to guide the ball to the letters.

Please note that this program was listed by a printer linked to a Pet computer. The special symbols used to indicate the colours have therefore been omitted. Instead the appropriate colours have been spelt out in square brackets in the following lines — 40,55,80,95,100,365,380,385 and 395.

Program notes

Lines 25-30 set up the variables.
Lines 80-85 ask which skill level you require (1-5).
Lines 140-175 provide the continuous ball movement, carrying out all the necessary rebounds when the ball reaches the edge of the screen.
Lines 180-220 check if a particular key has been pressed for changing the ball movement.
Lines 230-280 provide the ping as the ball hits the side of the screen. These lines also direct the ball in the opposite direction.
Lines 285-300 remove the letter from the screen once the ball has hit it.
Lines 305-315 stop the game and tell the player that his time is up. This time check is carried out in line 170 — the number 230 in this line indicates the time limit of two minutes and 30 seconds.
Lines 370-470 print out the keyboard controls for the ball movement.
Lines 425-600 are the subroutines for printing out the various skill levels.
Lines 605-640 hold the main subroutine for printing the border round the screen so that the ball can bounce off it.



```
5 REM * PING PONG #1 *
10 REM * SHAHID BUTT *
15 REM * (C) 10/10/82 *
20 POKE36878,10
25 TL=7680:TR=7701:BL=8164:BR=8185
30 A=1:B=81:C=32:E=128:AA=30720:SP=36879
35 POKESP,221
40 PRINT"■[BLU]■■■■■■■■                ■"
45 PRINT"■■■■■ PING PONG#1 ■"
50 PRINT"■■■■■                ■"
55 PRINT"■■[GRN] INSTRUCTIONS (Y/N) ?"
60 GETA$:IFA$="Y"THENGOSUB375:GOTO75
65 IFA$="N"THEN75
70 GOTO60
75 POKESP,93
80 PRINT"[BLK]■■■■■ENTER SKILL LEVEL
   1 - 5"
85 INPUTSK%:IFSK%<1ORSK%>5THEN80
90 POKESP,170
95 PRINT"■[RED]■■YOU HAVE 02 MINS AND
   30 SECS"
100 PRINT"■■■■PRESS ANY KEY TO PLAY
    ■■■■■■■■■■[RED]PING PONG#1■[BLU]"
105 POKE198,0:WAIT198,1:POKE198,0
110 GOSUB425
115 REM * START *
120 TI$="000000"
125 BA=INT(506*RND(1))+TL:IFPEEK(BA)<>
    CTHEN125
130 IF(BA+A)>=4348THENLE=INT(252*RND(1))
    +TL:GOTO140
135 LE=INT(252*RND(1))+4348
140 IFPEEK(LE)<>32THEN130
145 E=E+1:IFE=155THEN320
150 POKELE,E:POKELE+AA,LT
155 IFPEEK(BA+A)=ETHEN285
160 IFPEEK(BA+A)<>CANDPEEK(BA-A)<>CTHEN180
165 IFPEEK(BA+A)<>CTHEN230
170 IFVAL(TI$)>=230THEN305
175 POKEBA,C:BA=BA+A:POKE(BA),B:
    POKE(BA+AA),BB
180 GETM$:IFM$=""THEN155
185 IFM$="W"THENA=-22:GOTO155
190 IFM$="D"THENA=1:GOTO155
195 IFM$="A"THENA=-1:GOTO155
200 IFM$="X"THENA=22:GOTO155
205 IFM$="Q"THENA=-23:GOTO155
210 IFM$="E"THENA=-21:GOTO155
215 IFM$="Z"THENA=21:GOTO155
220 IFM$="C"THENA=23:GOTO155
225 GOTO 180
230 REM * PING *
235 FORP=1TO5:POKE36875,200:NEXT:
    POKE36875,0
240 IFA=1THENA=-1:GOTO155
245 IFA=-1THENA=1:GOTO155
250 IFA=22THENA=-22:GOTO155
255 IFA=-22THENA=22:GOTO155
260 IFA=21ORA=-21THEN275
265 A=21:IFPEEK(BA+A)<>CTHENA=-21
270 GOTO155
275 A=23:IFPEEK(BA+A)<>CTHENA=-23
280 GOTO155
285 REM * EXPLOSION *
290 POKE(BA+A),42:POKE(BA+A+AA),EX%
295 FORP=200TO255STEP2:POKE36875,P:NEXT:
    POKE36875,0
300 POKE(BA+A),C:GOTO130
305 REM * TIMES UP *
310 FORX=1TO40:PRINT:NEXT
315 PRINT" YOUR TIME IS UP":GOTO350
320 REM * FINISH *
325 MI$=MID$(TI$,3,2):SE$=RIGHT$(TI$,2)
330 FORX=1TO40:PRINT:NEXT
335 PRINT"■■YOU TOOK"
340 PRINT"■■"MI$" MINS AND "SE$" SECS.
    ■TO FINISH";
345 PRINT"■■ON  SKILL  ■LEVEL"SK%
350 PRINT"■■■■   ANOTHER GO (Y/N)"
355 GETA$:IFA$="Y"THEN30
360 IFA$<>"N"THEN355
365 POKESP,27:PRINT"■■■■■■■[RED]O.K.■
    [BLU]BYE":END
370 REM * INST *
375 POKESP,106
380 PRINT"■■■■■■■■■[CYN]■CONTROLS■"
385 PRINT"■■■■■[WHT]■■■■■■■Q   ■   E"
390 PRINT"■■■■■■■ \   |   /"
395 PRINT"■■■■■■■A - [RED]●[WHT] - D"
400 PRINT"■■■■■■■ /   |   \"
405 PRINT"■■■■■■■Z    X    C"
410 PRINT"■■■■■■■■■■■PRESS 'SPACE'"
415 GETA$:IFA$<>" "THEN415
420 RETURN
425 REM * SKILL *
430 ONSK%GOTO440,460,500,540,575
435 GOTO80
440 REM * L 1 *
```

```
445 TP=160:RI=160:BO=160:LF=160:CL=2:SC%=26:LT=2:BB=5:EX%=2
450 GOSUB605
455 RETURN
460 REM * L 2 *
465 TP=98:RI=97:BO=226:LF=225:CL=2:SC%=29:LT=5:BB=0:EX%=6
470 GOSUB605
475 POKETL,108:POKETR,123:POKEBR,126:POKEBL,124:FORX=TL+3TOTL+7:FORY=3TO7
480 POKEX+(22*Y),102:NEXTY:FORZ=15TO19:POKEX+(22*Z),102:NEXTZ,X
485 FORX=TL+14TOTL+18:FORY=3TO7:POKEX+(22*Y),102:NEXTY
490 FORZ=15TO19:POKEX+(22*Z),102:NEXTZ,X
495 RETURN
500 REM * L 3 *
505 TP=102:RI=102:BO=102:LF=102:CL=4:SC%=28:LT=4:BB=6:EX%=2
510 GOSUB605
515 FORX=TLTOTL+5:FORY=1TO5:POKEX+(22*Y),TP:NEXTY:FORZ=17TO22:POKEX+(22*Z),102
520 NEXTZ,X:FORX=TL+16TOTL+22:FORY=1TO5:POKEX+(22*Y),102:NEXT
525 FORZ=16TO22:POKEX+(22*Z),102:NEXTZ,X
530 FORX=TL+76TOBL-43STEP22:POKEX,102:POKEX+1,102:NEXT
535 RETURN
540 REM * L 4 *
545 TP=113:RI=107:BO=114:LF=115:CL=2:SC%=174:LT=6:BB=6:EX%=3
550 GOSUB605
555 POKETL,112:POKETR,110:POKEBR,125:POKEBL,109:FORX=TL+1TOTR-1:POKEX+(22*5),102
560 POKEX+(22*11),102:POKEX+(22*17),102:NEXT
565 FORX=TL+1TOTR-1STEP2:POKEX+(22*5),32:POKEX+(22*11),32:POKEX+(22*17),32:NEXT
570 RETURN
575 REM * L 5 *
580 TP=214:RI=214:BO=214:LF=214:CL=2:SC%=59:LT=0:BB=6:EX%=2
585 FORX=TL+22TOTL+27:POKEX,160
590 GOSUB605
595 FORX=TL+4TOTL+17:FORY=5TO17:POKEX+(22*Y),214:NEXTY,X
600 RETURN
605 REM * BORDER *
610 PRINT"■":POKE36879,SC%
615 FORX=TL+AATOBR+AA:POKEX,CL:NEXT
620 FORX=TLTOTR:POKEX,TP:NEXT
625 FORX=TRTOBRSTEP22:POKEX,RI:NEXT
630 FORX=BRTOBLSTEP-1:POKEX,BO:NEXT
635 FORX=BLTOTLSTEP-22:POKEX,LF:NEXT
640 RETURN
```

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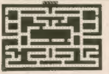

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The fun of the fairs

***David Kelly** reports on the spate of recent micro shows around the country.*

November 25 to 27
Northern Computer Fair, Belle View, Manchester

In terms of the number of visitors, this Belle View show was rated a great success. Attendances on each of the three days were high — 4,500 on Thursday, 4,500 on Friday and over 8,000 on Saturday.

Some 50 companies were represented, including most of the major software companies — Quicksilva, Artic, Silversoft and Bug-Byte.

There were some notable absentees among the machine manufacturers. Commodore was missing, as was Sinclair. Both Dragon and Lynx were present, but neither was able to sell machines over the counter. The first Lynx computers are only now beginning [illegible] appear and Dragon — suffering pre-Christmas shortages — was referring would-be buyers to local dealers.

Lone photographer at the London Home Computer Show, Westminster.

The *Northern Computer Fair* was intended to cater for both business and hobby interests. In practice, it was a show for the home enthusiasts. Stands offering games software did a roaring trade; those with business systems were disappointed with the response.

Surprisingly, for a show of this kind, there was almost no new material — hardware or software. Eve and Paul Gorton, on the Acorn Users' stand, demonstrated a device to aid the physically handicapped — using a loudspeaker input to control the progress of [illegible] computer game.

December 11 and 12
Christmas Microfest '82, University of Manchester Institute of Science and Technology

The Christmas Microfest was a fairly quiet affair. It suffered from the proximity of the Northern Computer Fair, which was held in the same city only two weeks earlier.

Crowd scene from the Northern Computer Fair, Manchester.

Considerably smaller than the first Microfest, held earlier [illegible] the year, this show had only about 20 exhibitors and was held on one floor rather than two. Only two manufacturers were represented — Micro Marketing for Jupiter Ace and Professional Data Systems for Epson.

Many of those present — Campbell Systems, Fuller and Lothlorien — had a disappointing show. The only company to have a busy two days was bookseller Haig and Hockland.

The lecture programme, so much a part of the first Microfest, was also disappointing. Only two lectures were given — one an introduction to microcomputing and the other dealing with peripherals.

One bright spot at the show was the first outing for Imagine Software's new game, *Arcadia*. The cassette, being sold from the Fuller stand, generated quite a bit [illegible] interest.

December 18
Fifth ZX Microfair, New Horticultural Hall, London

A highly successful one-day show resolved any doubts about the future [illegible] the ZX Microfair series. Following two disappointing shows earlier in the year, a well attended show was needed and the Christmas show was just that.

Over 7,000 visitors came along, packing the hall to bursting point. This was the biggest Microfair so far with over 120 exhibitors. Although there was nothing new to be seen, pre-Christmas buying was much [illegible] evidence.

The fair was notable for the reappearance of Sinclair Research, absent for the last few shows. For the first time Spectrums, both 16K and 48K, were being sold over the counter. It was amusing to see the Sinclair staff attempting to break into their giant red cash-box with [illegible] screwdriver, having mislaid the key.

Attention caught at the Fifth ZX Microfair, Westminster.

It was worth every minute. London Home Computer Show, Westminster.

January 7 to 9
London Home Computer Show, Royal Horticultural Society's Old Hall, Westminster

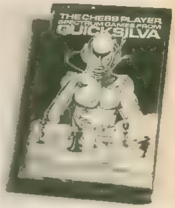
We must wait to see whether 1983 will be the year [illegible] the Dragon — but it certainly got off to a good start.

The London Home Computer Fair, held a fortnight ago, was dominated by the Dragon 32 microcomputer. Of the 50 or so exhibitors, many offered new software for the machine — including Salamander, Microdeal, Postern, A & F, Romik, Lothlorien and Hilton. On the hardware side, Microdeal was selling a light-pen for the Dragon at £12.

The show also saw the first software for the Commodore 64 machine — Llamasoft sold a version of its *Grid Runner* program for £8.50. Surprisingly there was very little of interest [illegible] the Vic20 owner — Rabbit, Romik and Llamasoft being the main software houses present.

There was also little interest [illegible] the Spectrum material on display — both Quicksilva and Silversoft were disappointed at the response.

All [illegible] all, an enjoyable exhibition. Attendances over the three days totalled just under 12,000. The next Argos show will be [illegible] Manchester in April. ■



Chequered

John White *looks at chess programs*

People have been playing chess on microcomputers almost since the first micro was launched in 1975. The standard of these programs has steadily improved since 1977, as word of old and new techniques began to filter through to machine code programmers.

The advantages of programming chess for a micro are a fairly large computer memory (the early dedicated chess computers mostly used only 4K programs, the 4K chip having just come down in price), and the ability to provide a graphic display of the board and pieces. Unfortunately, chess requires the movement of black and white pieces on black and white squares and this requires some ingenuity in drawing the pieces, particularly on machines such as the Tandy TRS80 with their low resolution graphics.

The hardest part of defeating the early programs was trying to understand which piece was which. I have not forgotten the shock I once had when a "pawn" shot out across the board to capture my queen. The advent of colour computers considerably eases the problem — for example red and blue pieces can be placed on yellow and green squares.

One of the earliest chess programs, released for use on microcomputers in 1978, was Jenning's *Microchess*. Originally found on the Pet computer in 6502 code and on the Tandy TRS80 in Z80 code, the "1.5" version occupied some 4K of Ram and was written entirely in machine code. Before long, the "2.0" version, an improved 8K program, was released offering some additional book openings. In its various versions, *Microchess* has now sold well over 20,000 programs worldwide and can still be found for the Pet, TRS80, Apple and Atari 400/800 computers.

Microchess uses a limited look-ahead with up to eight levels of difficulty. Its standard of play is rather weak, but suitable for beginners.

In 1978, Dan and Kathe Spracklen invented an 8K program in Z80 code which they called *Sargon*. Within a few months it had come top of one of the early all-computer chess tournaments. The program was published in book form as *Sargon – a Chess Program* containing the full macro-assembly code. Various versions of *Sargon I* are now available in the UK.

The first version was for the ubiquitous TRS80, at about £15. It made sophisticated — and largely incomprehensible — use of the machine's limited graphics ability. *Sargon I* is also available for the Nascom II computer, complete with a special graphics Rom and the book for about £45. Yet another version can be obtained free of charge to members of the Yeovil Sharp Users' Group for the Sharp MZ-80K. This uses only upper and lower case letters to represent the pieces, which are lost in the large surrounding squares. My copy has a slight bug in the queen's pawn opening move.

Sargon I was also translated into 6502 code for the Apple computer, whose high-res graphics provided one of the first easily understood chess boards on a screen.

Sargon I has six levels of play, each level representing one half move (one play) of search ahead. Level one takes 5-10 seconds per move, level two around a minute and level three up to five minutes. Level six is reputed to take up to 48 hours per move, and may be useful for postal chess.

There are only two book openings, P-K4 or P-Q4. The standard of play is good, even at the lowest level. In 1979 this was the strongest program commercially available.

The Spraklens followed up *Sargon I* with *Sargon II*. This has not been published in book form, but is licenced by Hayden to several software distributors. *Sargon II* embodies new methods of searching to deep levels and is much faster than *Sargon I*. There are seven levels, ranging from a few seconds to several hours for postal chess. Most of the levels operate well within the tournament limits of three minutes per move.

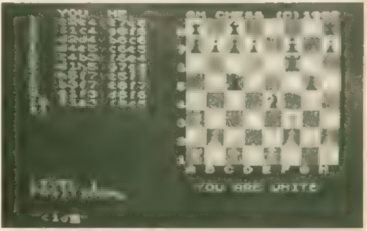
Sargon II was originally written in Z80 code, but was soon translated into 6502 code in which form it has done very well in numerous all-computer chess tournaments. *Sargon II* was the immediate predecessor to the famous Sargon 2.5 chess computer and is thus a grandfather of the present series of immensely powerful commercial chess computers such as the Champion Challenger and Morphy.

Sargon II occupies less than 16K Ram and provides several standard book openings. Not only is it very fast, but its standard of play far exceeds that of the majority of other microcomputer programs. Another feature is the excellence of its endgame play, an area where the Spracklens seem to excel — and which is much poorer or missing altogether in many competitive programs.

Sargon II can be purchased on cassette or disc for the TRS80 Video Genie machines where, curiously, the graphics are even worse than for the *Sargon I*, and for the Apple where the graphics are excellent. A Rom version, with good colour graphics, is also available for the unexpanded Vic20. You should expect to pay between £20 and £30 for *Sargon II*.

Philidor Software, designers of the present commercial world chess computer champion, *Chess Champion Mk V*, wrote the *Pet Chess* program for the Pet computer, distributed by ACT Microsoft. The graphics are excellent and very clear, showing what can be done with a limited graphics set. The standard of play is also very good, particularly in the way the pieces are moved into attack positions and pawns are advanced.

Pet Chess plays remarkably like a human opponent. Against this must be set the fact that the program's playing strength is a little weaker than *Sargon II*, and it exchanges pieces at every opportunity.



CP Software's SuperChess for the ZX Spectrum.

SPECTRUM VOICE
SUPE

nature of micro chess

ms old and new for the Vic20, Pet, ZX81, TRS80 and Spectrum.

The king is ■ little static ■ the endgame where the program relies on the excellence of its pawn moves.

Pet Chess has a colossal book opening library of 3570 moves, including some unusual lines, and requires a 32K Pet to run in. *Pet Chess* is one of my favourite programs. Its strategic abilities enable it to mimic human play, compensating for its slight tactical inferiority to other strong programs. Expect to pay around £25 for a cassette or disc version for the Pet 3000, 4000 and 8000 series machines.

The strongest chess program for the ZX81 is Artic's *ZX Chess II*. Although this provides a screen display using letters for pieces, a special graphics version is available from QuickSilva for some £45, including the price of their special graphics Rom. These graphics are fairly simple but reasonably clear.

ZX Chess II is a 9K program which features a few shallow book openings and has extra endgame routines added to improve the play in this important area. There are seven levels of which five play within normal tournament speeds, looking up to eight ply ahead. Provisionally graded at BCF 110, this is one of the best of the non-professional programs. *ZX Chess II* can be purchased for £10.

Artic has also produced a version of *ZX Chess II* for the Sinclair Spectrum — £14 — requiring 48K Ram. The graphics are similar to those shown in the Sinclair Spectrum advertisement. A talking version is also being developed.

Spectrum-ZX Chess II made an appearance in the recent London all-computer championship where it was heavily beaten by dedicated units without being disgraced. All-computer matches measure little more than the depth of computer search, and ■ dedicated unit is bound to be faster than a domestic micro.

MikroGen's *Chess* — also sold under the Psion label — was one of the first for the ZX81. At £6.50, this 10K program offers five levels with "look-ahead" There are no book openings, but the program will select randomly between moves of roughly equal merits The playing strength is a little weaker than *ZX Chess II* There is also a chess clock provided which can be used to determine the time taken by two humans over a game ■ chess.

The 48K Spectrum version of MikroGen's *Chess* is known as *Chess* when distributed by Psion, and *MasterChess* if distributed by MikroGen. Both programs are similar, but *MasterChess* has a slightly superior program and a wide range of colour options which can be selected for the board and pieces There is no colour option for the Psion version. The following program description applies equally to the Psion and MikroGen versions.

The high-res graphics are excellent. It is extremely easy to set up positions, uncompleted games can be saved onto tape, the moves can be output onto the Sinclair printer and the program will recommend a move if requested, or allow you ■ change levels or colour at any time. There are 10 levels ranging from almost instant response ■ hours. Levels 4 and 5 approximate to tournament speeds of 2-3 minutes per move, although the program plays much faster ■ the endgame.

There is a limited range of shallow openings, some being a little eccentric. The midgame play is very sound and quite fast; *MasterChess* is a significant improvement on the ZX81 version. The endgame play is also pretty good, the king becoming very active. *MasterChess* is a strong program for the Sinclair Spectrum and can confidently be recommended. It costs £7.

David Horne's 2K chess program — £3.95 from Artic — is designed to fit into the unexpanded Timex-Sinclair 1000 for the US market. It can also be used ■ a ZX81 with 16K Ram. A 1K version is available at £2.95 for the ZX81

To pack a complete chess program into 1K or 2K is an amazing feat, but when you have finished marvelling, what are you left with? The program packing means that the screen display ■ tucked into a small area of the screen and the pieces can be seen flashing from square to square as they test each move.

Move entry is a little weird. To enter the move E2-E4, you type in 2E4E which is shown on the screen as E4 E2. The board is also shown upside down for some undefined reason.

Facilities include three book opening strings of eight moves each and the ability to play as white or black, or letting the computer play against itself. In the latter case, the movement of pieces as the machine decides its moves makes the game impossible ■ follow.

The program does not look ahead and its play is correspondingly weak. I beat it in four successive games in 12, 11, 15 and ■ moves. There seems to be quite an emphasis on pawn moves at the cost of development. But the program will not accept illegal moves, and it is quite useful for beginners learning to play chess.

The *Boss* program has been released for the Vic20 with at least 8K Ram. Produced in West Germany by Kavan Software, and distributed ■ the UK by Audiogenic for £15, it is claimed to be stronger than *Sargon II*.

The board display uses excellent high-res graphics and is extremely clear. When playing black, the board ■ inverted and so is the notation, a useful addition. One feature I particularly liked — compared with *Sargon II* — is that moves were made and accepted or rejected with no fuss *Sargon II* sees fit to make a pointless to-and-fro with each piece before moving it. *Boss* just moves the piece.

Facilities offered include 10 levels of which seven play within tournament limits. There are two clocks to record the time taken by each side and a good range of opening moves

Boss uses a similar method of move assessment ■ *Sargon II*, as is now found in the best commercial chess computers. It has undoubtedly been written by professional chess programmers.

There is one important omission from this program — it is not possible to set up your own position. So, if you inadvertently type in a legal move such as h7-h5 instead of the intended a7-a5, you have no way of correcting the error. It is also impossible ■ set up endgame positions.

Conclusions

I can't imagine anyone buying a personal computer just to run a particular chess program — much better to buy a dedicated chess computer. Recommendations are of little value, since you are limited to the programs available for your computer. Instead, I shall just indulge myself with ■ list of personal preferences. I like (in alphabetical order): *Boss, PetChess, Sargon II* and *ZX Chess II*. ■

***Open Forum* is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.**

3D Saucer

on BBC Micro

This program demonstrates the superb high resolution graphics of Mode 0 on the BBC Microcomputer.

It plots a SIN function (line 150) dot-by-dot, and takes 12 minutes to complete the 3D representation of a flying saucer (or blancmange if you feel like it!). In order to save time on subsequent uses, the user defined keys are set up to enable you to save the entire screen directly onto tape (f0), and to load it from tape in about four minutes (f1).

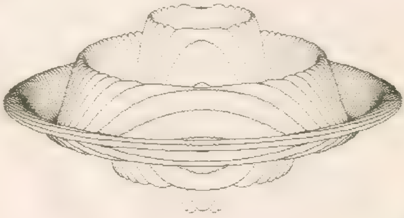
There are many ways to change the display. Try:

1 Altering the SIN function to COS.
2. Altering the values of the Z%, Z1%, and Z2% variables at line 90. (One at a time if you want to follow what goes on.)
3. Loading the screen tape with the Beeb in Mode 2.
4. Setting up the other user definable keys to enable fast colour changes. (Use the VDU 19 command to redefine the colours.)

Lines 50 and 60 may need some explanation. |\|@|@|@|@ defines a text window of zero size so that the text which accompanies saving and loading is out of sight and does not spoil the display. V.7 gives a beep when the operation is complete, and :Z restores the normal text window.

PROGRAM OF THE WEEK

```
>L.
   10REM 3D SAUCER/HIGH RES.GRAPHICS DEMO.
   20REM BY C.R.WOODINGS 1982
   30REM NEEDS A 32K BBC MICRO
   40MODE7
   50*KEY0 |\|@|@|@|@:*SAVE"SCREEN"3000 8000:M|M:V.7:|Z
   60*KEY1 |\|@|@|@|@:*LOAD"SCREEN"3000|M:V.7:|Z
   70PRINTTAB(10,10)"Do you already have the shape on tape? (Y/N) ";
   80A$=GET$:IF A$="Y" OR A$="y" THEN MODE0:PRINTTAB(10,10)"Set the tape to load
 and press key f1. Loading will take about 5 mins":END
   90 Z1%=3:Z2%=24:Z3%=Z1%*6:Z%=69:C%=1:X1%=640:X2%=X1%*X1%:Y1%=512:Y2%=512:E%=1
  100 MODE0:VDU19,1,4,0,0,0,19,0,3,0,0,0
  110FOR X%=0 TO X1% STEP 2
  120X4%=X%*X%:A%=SQR(X2%-X4%)
  130FOR I%=-A% TO A%STEP Z2%
  140R=SQR(X4%+I%*I%)/X1%
  150Y%=I%/Z1%+(R-C%)*SIN(Z3%*R)*Y2%
  160IFI%=-A%THENM%=Y%:M1%=Y%:Y%=Y1%+Y%:GOTO200
  170IFY%>M%THENM%=Y%:Y%=Y1%+Y%:GOTO200
  180IFY%<M1%THENM1%=Y%:Y%=Y1%+Y%:GOTO200
  190GOTO210
  200PLOTZ%,X1%+X%,Y%:PLOTZ%,X1%-X%,Y%
  210NEXT:NEXT
  220VDU7
  230END
```



3D Saucer
by Chris Woodings

Lane Racer

on Vic-20

This is a car going around a circuit. You guide it and collect dots. But there are two robot cars after you. You use the Keys ■ and C to swap lanes when you come to an opening. If a robot car catches you, you will die. The program uses user defined graphics characters and fits in 3.5K.

Program notes

20 to 200	Draw the circuit
300 to 330	Initialise the variables
400 to 452	Controls your car
500 to 570	Controls the robot cars.
700 to 730	Controls the lane changing.
800 to 886	Control the crash
5000 to 6060	Create the characters

```
10 POKE36879,8:PRINT"■■":POKE36865,150
11 PRINT"■      ■ LANE RACER
12 PRINT"■■■ (1982)A BLACKHAM'S
13 PRINT"■■■ USE KEYS Z AND C     ■ TRY
   TO COLECT THE DOTS WITHOUT
14 PRINT"■HITING ANOTHER CAR!
18 PRINT"■■■      ■PLEASE WAIT"
19 FORI=150TO38STEP-1:POKE36865,I:FORR=1
   TO70:NEXT:NEXTI:GOTO5000
20 REM DRAW BOARD
30 PRINT"■■■■CCCCCCCCCCCCCCCCCC←";
40 PRINT"■D                     E";
50 PRINT"■D @CCCCCCCCCCCCCCC← E";
60 PRINT"■D D                E E";
70 PRINT"■D D @CCCCCCCCCCC← E E";
80 PRINT"■D D D            E E E";
90 PRINT"■D D ■ @CCCCCCC← E E E";
100 PRINT"■D D D D           E E E E";
110 PRINT"■D          @CCCC←        E";
120 PRINT"■D          £BBBBA        E";
130 PRINT"■D D D D           E E E E";
140 PRINT"■D D D £BBBBBBBBA E E E";
150 PRINT"■D D D              E E E";
160 PRINT"■D D £BBBBBBBBBBBBA E E";
170 PRINT"■D D                  E E";
180 PRINT"■D £BBBBBBBBBBBBBBBBA E";
190 PRINT"■D                      E";
200 PRINT"■£BBBBBBBBBBBBBBBBBBBBBA";
300 REM SET UP GAME
301 REM C(1)&C(2)ROBOT          CARS
302 REM D(1)&D(2)
303 REM DIRECTION OF
304 REM ROBOT CARS.
305 POKE36874,128:POKE36878,9
310 Y=7901:C(1)=7916:C(2)=7918
320 D=22:D(1)=22:D(2)=22
330 S=6
400 REM CONTROLE YOURS          Y=YOUR CAR
401 REM D=DIRECTION
410 Q=PEEK(Y+D)
420 IFQ=2THEND=1:S=7
425 IFQ=3THEND=-1:S=7
430 IFQ=4THEND=22:S=6
435 IFQ=5THEND=-22:S=6
437 POKEY,32
438 IFQ=8THENSC=SC+1
439 IFS=7THEN450
440 GETA$
441 IFPEEK(Y+22)=2THEN450
442 IFS=7THEN450
443 IFY<7790THEN450
445 IFA$="Z"ANDPEEK(Y-1)=32THENY=Y-2
447 IFA$="C"ANDPEEK(Y+1)=32THENY=Y+2
450 Y=Y+D
451 POKEY,S:POKE30720+Y,7
452 PRINT"■"SC
500 REM ROBOT CARS
510 FORI=1TO2
515 POKEC(I),8
520 Q=PEEK(C(I)+D(I))
523 IFC(I)=YTHEN800
530 IFQ=3THEND(I)=1:S(I)=7
535 IFQ=5THEND(I)=22:S(I)=6
540 IFQ=2THEND(I)=-1:S(I)=7
545 IFQ=4THEND(I)=-22:S(I)=6
550 C(I)=C(I)+D(I)
552 IFS(I)=6ANDPEEK(C(I)+1)=32THENM=2:
    GOSUB700:GOTO555
554 IFS(I)=6ANDPEEK(C(I)-1)=32THENM=-2:
    GOSUB700
555 POKEC(I),S(I):POKE30720+C(I),3
560 NEXTI
570 GOTO400
700 REM LANE CHANGE
710 X=INT(RND(1)*3)
720 IFX=2THENC(I)=C(I)+M
730 RETURN
800 REM CRASH
810 POKEY,9
825 POKE36877,221:POKE36878,15:POKE36874,
    0:B=28
830 FORL=15TO0STEP-1
840 POKE36878,L
845 B=B+10 POKE36865,B
850 FORM=1TO500:NEXT
860 NEXT L
870 POKE36877,0
874 POKE36869,240:POKE36865,38
875 PRINT"■YOU SCORED "SC
880 PRINT"DO YOU WANT ANOTHER GO(Y
    OR N)?"
882 GETA$:IFA$=""THEN882
885 IFA$="Y"THENCLR:POKE36869,255:GOTO20
886 END
5000 REM CHAR MAKER
5010 POKE56,28:POKE52,28
5020 FORI=7168TO7679:POKEI,PEEK(I+25600)
     :NEXT
5030 POKE36869,255
5040 READQ:IFQ=1THEN30
5050 FORC=QTOQ+7:READA:POKEC,A:NEXT
5060 GOTO5040
6000 REM DATA FOR CHAR
6010 DATA7168,255,255,192,192,192,192,
     192,192,7416,255,255,3,3,3,3,3,3
6020 DATA7392,192,192,192,192,192,192,
     255,255,7176,3,3,3,3,3,3,255,255
6030 DATA7184,0,0,0,0,0,0,255,255,7192,
     255,255,0,0,0,0,0,0
6040 DATA7200,192,192,192,192,192,192,
     192,192,7208,3,3,3,3,3,3,3,3
6050 DATA7216,90,126,90,24,24,90,126,90,
     7224,0,119,34,127,127,34,119,0
6060 DATA7232,0,0,24,24,24,0,0,0,7240,
     56,108,238 130,238,238,238,254,1
READY.
```

Lane Racer

by Alan Blackham

Sinclair ZX Spectr

16K or 48K RAM... full-size moving-key keyboard... colour and sound... high-resolution graphics...

From only £125!

ZX Spectrum
BLUE
RED
MAGENTA
GREEN
CYAN
YELLOW
WHITE
CAPS SHIFT

First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power – personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer – available now – is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232 / network interface board.

Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper- and lower-case characters.
- Teletext-compatible – user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

'um

ZX Spectrum software on cassettes – available now

The Spectrum software library ▩ growing every day. Subjects include games, education, and business/household management. Flight Simulation... Chess... Planetoids History... Inventions... VU-CALC... VU-3D ...Club Record Controller... there ▩ something for everyone. And they all make full use of the Spectrum's colour, sound, and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

ZX Expansion Module

This module incorporates the three functions of Microdrive controller, local area network, and RS232 interface. Connect it to your Spectrum and you can control up to eight Microdrives, communicate with other computers, and drive a wide range of printers.

The potential ▩ enormous, and the module will be available in the early part of 1983 for around £30.

sinclair

Sinclair Research Ltd, Stanhope Road,
Camberley, Surrey GU15 3PS.
Tel: Camberley (0276) 685311.

The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature ▩ COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed ▩ 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear ▩ your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.

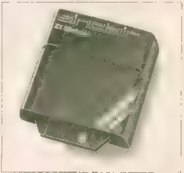
The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing by providing mass on-line storage.

Each Microdrive can hold up to 100K bytes using a single interchangeable storage medium.

The transfer rate is 16K bytes per second, with an average access time of 3.5 seconds. And you'll be able to connect up to 8 Microdrives to your Spectrum via the ZX Expansion Module.

A remarkable breakthrough at a remarkable price. The Microdrives will be available in the early part of 1983 for around £50.



How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard.

EITHER WAY – please allow up to ▩ days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR.

Qty	**Item**	**Code**	**Item Price £**	**Order Total £**
	Sinclair ZX Spectrum – 16K RAM version	100	125.00	
	Sinclair ZX Spectrum – 48K RAM version	101	175.00	✓
	Sinclair ZX Printer	27	59.95	✓
	Printer paper (pack ▩ 5 rolls)	16	11.95	✓
	Postage and packing: orders under £100	28	2.95	✓
	orders over £100	29	4.95	✓
			Total £	200.00

Please tick if you require a VAT receipt ✓

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £ 2000

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable

Signature

PLEASE PRINT

Name Mr/Mrs/Miss BLERGY BLERGY

Address [illegible]

POC901

FREEPOST – no stamp needed. Prices apply to UK only. Export prices on application.

Space Rescue

on Spectrum

The game starts with the mother ship moving back and forth on top of a band of asteroids, your objective is to manoeuvre your rocket through the asteroids to land safely on the launch pad and rescue the survivors (six).

To launch your ship from the mother ship press "space bar". Press zero to turn on the boosters and a 1 to turn them off. Press 5 to go left and 8 to go right.

You may vaporise an asteroid by igniting your booster rockets, but only if you are directly over it; this also slows your rocket's descent.

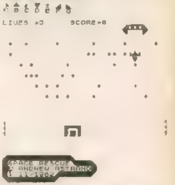
User defined graphics and graphics symbols

20	A + B + C,E,E
24	(CAP SHIFT 4) + 3 + 7, (CAP SHIFT 5) + (CAP SHIFT B) + 5
30	SPC + F + H + H + H + G + SPC,SPC + inv G, A + B + C,inv F
65	D
140	E
170	E
230	■
2000	inv A + B + C, inv D

After all six survivors are rescued you get a bonus and an extra life and the next screen increases in difficulty.

```
  5 BORDER 3  PAPER 0  INK 7  
15
  7 INPUT "Enter difficulty fac
tor (1 TO 6)";k
  8 IF k<1 OR k>6 THEN GO TO 7
 10 FOR x=144 TO 151  LET a$=CH
R$ x  FOR y=0 TO 7  READ a  POKE
 USR a$+y,a  NEXT y  NEXT x
 14 LET l=3  LET sc=0
 15 LET f$=" "

 16 PRINT AT 0,0;"LIVES =";l;"
   SCORE=";sc
 17 INK 5
 20 LET t=0  LET y=3  LET s$="▲
"  LET m=6  LET m1=0  FOR x=19
TO 21  PRINT AT x,0;"*";AT x,31
;"*"  NEXT x
 21 INK 7
 22 PRINT AT 0,0;"LIVES =";l;"
   SCORE=";sc
 23 IF m=0 THEN GO SUB 3000
 24 INK 7  LET q=INT (RND*28)+1
  PRINT AT 20,q; FLASH 1; INK 6;
 PAPER 4;"▛▀▜";AT 21,q;"█▀█"  FL
ASH 0
 25 INK 4  FOR x=4 TO 15 STEP 2
  FOR z=1 TO k  BRIGHT 1  BEEP 0
.005,30  PRINT AT x,INT (RND*31)
;"•"  NEXT z  NEXT x  BRIGHT 0
 30 INK 3  FOR f=25 TO 0 STEP -
1  PRINT AT 1,f;" ▄▄▄ ";AT 2,f
;"◥";AT 2,f+2; INK 6;"▲";AT 2
,f+5; INK 3;"◤"  IF INKEY$<>" "
THEN GO TO 50
 40 BEEP 0.1,-10  NEXT f  PRINT
 AT 1,f;"     ";AT 2,f;"
"  GO TO 30
 50 LET k=f+2  PRINT AT 2,k;"
"
 55 PRINT AT 0,7; BRIGHT 1;l;AT
0,19; BRIGHT 1;sc  BRIGHT 0
 60 IF SCREEN$ (y,x)="•" THEN LE
T l=l-1  GO SUB 2000  GO TO 22
 61 IF SCREEN$ (y,x+1)="•" THEN
 LET l=l-1  GO SUB 2000  GO TO 2
2
 62 IF SCREEN$ (y,x+2)="•" THEN
 LET l=l-1  GO SUB 2000  GO TO 2
2
 65 PRINT AT y,x; INK 6;s$  IF
t=1 THEN PRINT AT y+1,x+1; INK 2
;"▼"
 66 BEEP 0.1,20-y  IF y>=18.5 A
ND x=q THEN GO TO 130
 67 IF y>=19 AND x<>q THEN LET
l=l-1  GO SUB 2000  GO TO 22
 70 LET x1=x  LET y1=y  LET x=x
+(INKEY$="8" AND x<29)-(INKEY$="
5" AND x>1)
 80 IF INKEY$="0" AND t=0 THEN
LET t=1
 90 IF INKEY$="1" AND t=1 THEN
LET t=0
100 PRINT AT y1,x1;"   "  IF t=
1 THEN PRINT AT y1+1,x1+1;" "
110 IF t=1 THEN LET y=y+.5  GO
TO 55
120 LET y=y+1  GO TO 55
130 LET sc=sc+10  PRINT AT 0,19
;sc  LET m=m-1  IF m=5 THEN LET
a=19  LET b=31
131 IF m=4 THEN LET a=20  LET b
=31
132 IF m=3 THEN LET a=21  LET b
=31
133 IF m=2 THEN LET a=19  LET b
=0
134 IF m=1 THEN LET a=20  LET b
=0
135 IF m=0 THEN LET a=21  LET b
=0
140 INK 6  FOR c=1 TO 5  PRINT
AT a,b;"X"  BEEP 0.1,20  PRINT A
T a,b;"*"  PAUSE 5  NEXT c  PRIN
T AT a,b;" "
150 IF b=0 THEN FOR d=1 TO q-1
160 IF b=31 THEN FOR d=30 TO q+
3 STEP -1
170 PRINT AT 21,d;"*"  BEEP 0.0
5,10  PRINT AT 21,d;" "  NEXT d
180 PRINT AT y,x;"   "  IF t=1
THEN PRINT AT y+1,x+1;" "
190 LET y=y-1
200 IF SCREEN$ (y,x)="•" THEN LE
T l=l-1  GO SUB 2000  GO TO 22
210 IF SCREEN$ (y,x+1)="•" THEN
 LET l=l-1  GO SUB 2000  GO TO 2
2
220 IF SCREEN$ (y,x+2)="•" THEN
 LET l=l-1  GO SUB 2000  GO TO 2
2
230 PRINT AT y,x; INK 6;s$;AT y
+1,x+1; INK 2;"▼"  BEEP 0.1,20-y
240 IF y=2 AND x=f+2 THEN LET t
=0  FOR g=0 TO 30  BEEP 0.05,g
NEXT g  LET sc=sc+10  PRINT AT 0
,19;sc  LET y=3  LET m1=m1+1  FO
R s=1 TO 10  PRINT AT s,0;f$  NE
XT s  PRINT AT 20,q;"   ";AT 21,
q;"   "  GO TO 23
250 IF y=2 AND x<>f+2 THEN LET
l=l-1  GO SUB 2000  GO TO 22
260 LET x1=x  LET y1=y  LET x=x
+(INKEY$="8" AND x<31)-(INKEY$="
5" AND x>0)
270 PRINT AT y1,x1;"   ";AT y1+
1,x1+1;" "
290 LET y=y-.5  GO TO 200
1000 DATA 0,0,12,12,12,18,18,18,
24,24,24,60,255,255,255,0,0,0,48
,48,48,240,240,48,255,255,126,12
6,60,60,24,24,16,56,16,254,16,16
,40,68
1010 DATA 1,3,7,15,31,63,127,255
,128,192,224,240,248,252,254,255
,255,255,195,195,195,195,255,255
2000 FOR w=1 TO 10  INK RND*5+1
 BEEP 0.05,w+10  PRINT AT y,x;"
   ";AT y+1,x+1;" ";AT y,x;"▟▙▖";
AT y+1,x+1;"▞";AT y,x;s$;AT y+1
,x+1;" ";AT y,x;"   "  NEXT w
2005 PRINT AT y,x;"   ";AT y+1,x
+1;" "  FOR s=1 TO 10  PRINT AT
s,0;f$  NEXT s
2010 PRINT AT 20,q;"   ";AT 21,q
;"   "  LET x=0  LET y=2  IF l=
0 THEN GO SUB 4000
2020 RETURN
3000 INK m1+1  CLS  PLOT 55,87
 DRAW OVER 1;120,120.5913*PI
3010 FLASH 1  INK 7-m1+1  PRINT
AT 0,0;"BONUS"  BEEP 0.1,RND*10
  PRINT AT 0,27;"BONUS"  BEEP 0
.1,RND*10  PRINT AT 21,0;"BONUS"
  BEEP 0.1,RND*10  PRINT AT 21,
27;"BONUS"  BEEP 0.1,RND*10  PR
INT AT 10,12;"BONUS"  FOR t=1 TO
 15  BEEP 0.05,t  NEXT t
3020 LET k=k+1  LET sc=sc+(m1*10
)  PAUSE 50  FLASH 0  PRINT AT 2
1,0;""  FOR j=0 TO 21  POKE 2369
2,255  PRINT f$  NEXT j  LET l=l
+1  GO TO 16
4000 CLS  INK 6  FOR i=0 TO 21
 PRINT AT i,0;"YOU BLEW IT....."
  NEXT i  FOR i=0 TO 21  INK 3
PRINT AT i,16;"SCORE = ";sc  NEX
T i
4005 PAUSE 50
4010 PRINT AT 21,0;""  FOR j=0 T
O 21  POKE 23692,255  PRINT f$
NEXT j
4020 INK 6  PRINT AT 21,0;"Do yo
u want to play again (y/n)"  IF
INKEY$="" THEN GO TO 4020
4030 IF INKEY$="y" THEN RUN
4040 IF INKEY$="n" THEN STOP
4050 GO TO 4020
```



Space Rescue
by Andrew Astrand

Equations

on ZX81

This listing [illegible] for the 1K ZX81 but can also be used on an expanded machine. I believe it to be an unique program in that it solves both Quadratic and Simultaneous equations all in 1K on the ZX81. For you maths people, Quadratics are solved using

$$X = \frac{- b \pm \sqrt{b * * 2 - 4ac}}{2a}$$

and the Simultaneous equations by a matrix method.

I had to use a number of memory saving tricks to fit the program into 1K e.g. CODEs of characters instead of numbers and also, in line 14, the "AND" is shift 2.

When the first display comes up, press Q for Quadratic equations or S for Simultaneous equations (of two unknowns). Then when the equations come onto the screen enter each number followed by *Newline* not forgetting of course to put minus signs in if there are any in your own equation.

The first character in reverse in line 2 is a reverse Q and the second is a reverse S; the graphics are lines 4, character 7 (not as shown); 6, character 3 (not as shown); 8, character 8; 10, character 4; 12, character 2; 13, character 2; 17, characters 8, 1, 8.

The program should prove useful to O-level maths candidates to check their homework whether they have expansion or not.

Program notes

2 to 6	"Which type of equation?"
7 to 15	Solve the quadratic equation.
16 to 23	Solve simultaneous equations.
24 to 27	Display result then if key pressed, RUNs again
30 to 31	Roots [illegible] quadratic are imaginary numbers.
50 to 59	Input routine.
60 to 61	Infinite number of solutions to equations.

```
READY.

 2 PRINT "PRESS ■ QUAD. OR ■ SIMUL."
 3 LET A$=INKEY$
 4 IF A$="Q" THEN GOTO CODE "▖"
 5 IF A$="S" THEN GOTO CODE "<"
 6 GOTO CODE "▖"
 7 CLS
 8 PRINT AT CODE "",CODE "■";"AX**
  2+BX+C=0"
 9 GOSUB CODE "M"
10 LET ZX=B*B-CODE "▖"*A*C
11 IF ZX<CODE "" THEN GOTO CODE "Z"
12 LET X1=(SQR ZX-B)/(CODE "▘"*A)
13 LET X2=(-SQR ZX-B)/(CODE "▘"*A)
14 PRINT "ROOTS ARE ";X1;" AND ";X2
15 GOTO CODE "."
16 CLS
17 PRINT AT CODE "",CODE "■";"AX+BY=
   C";AT CODE "▗",CODE "■";"DX+EY=F"
18 GOSUB CODE "M"
19 LET DET=A*E-B*D
20 IF DET=CODE "" THEN GOTO CODE "W"
21 LET X=(E*C-B*F)/DET
22 LET Y=(A*F-D*C)/DET
23 PRINT "X= ";X;" ,Y=";Y
24 PRINT "PRESS A KEY"
25 IF INKEY$="" THEN GOTO CODE ";"
26 CLS
```

To next page

from previous page

```
27 RUN
30 PRINT "ROOTS UNREAL"
31 GOTO CODE "."
50 PRINT "GIVE A,B,C";
51 INPUT A
52 INPUT B
53 INPUT C
54 IF A$="0" THEN RETURN
55 PRINT "GIVE D,E,F"
56 INPUT D
57 INPUT E
58 INPUT F
59 RETURN
60 PRINT "NO UNIQUE SOLUTION"
61 GOTO CODE "."
```

Equations
by Mike Davies

Music Transposer

on Vic-20

This program should be of value, not only to the musician, but to anyone creating music on the Vic. The object of the program is to change the key of any type of music. The musician may require to transpose a piano piece for a trumpet, or the Vic programmer may find some notes are too high or too low to use, so transposition is needed.

The program is straightforward to use; if you wish to change a piece of music from the key of C to the key of G, firstly, the program asks for a note — enter C here, then the note required is G. The program computes the number of semitones to be shifted and then asks for a note. This will be notes from the original piece in the key of C, and the new notes given will be the ones required for the key of G.

On all inputs the *Return* key is not needed. The prompt signal is a yellow block. Enter any relevant note. If a sharp is needed (the program only recognises sharps) press '3'. If not then any other key will suffice. The program is entirely foolproof.

Program notes

50 to 80	Sets the display.
100 to 104	Accepts the first note in
105	Ensures that 'E' and 'B' notes cannot be sharpened.
106 to 109	Checks if note is sharp or not.
110 to 119	Same as above but for note required.
120 to 190	Calculates the transposition needed.
200 to 225	Same as lines 100 to 109 but for note entered.
250 to 350	Sorts out the new note.
500	Prints the yellow prompt block.
600	A half second delay subroutine.

```
10 REM              (VIC) MUSIC TRANSPOSER   BY  ANDY HORRELL
20 DATAC,1,C#,2,D,3,D#,4,E,5,F,6,F#,7,G,8,G#,9,A,10,A#,11,B,12
50 POKE36879,205:PRINT"]■■ VIC MUSIC TRANSPOSER ■"
60 FORT=1TO16:PRINT:NEXT:PRINT"■ USE SHARPS NOT FLATS "
70 FORT=8098TO8185:POKET+30720,5:POKET,160:NEXT
80 PRINTTAB(3)"■■                "SPC(5)" USE '3' FOR '#' "SPC(5)"
   ■"
100 PRINT"■■■■ENTER ■ NOTE  ■";
103 GOSUB500:GETNI$:IFNI$=""THEN103
104 IFASC(NI$)<65ORASC(NI$)>71THEN103
105 PRINTNI$;:GOSUB600:IFNI$="E"ORNI$="B"THEN110
106 GOSUB500:GETAI$:IFAI$="3"THENNI$=NI$+"#"
108 IFAI$=""THEN106
109 PRINT"■"NI$" ";
110 PRINT:PRINT"■■NOTE REQUIRED ■";
113 GOSUB500:GETNR$:IFNR$=""THEN113
115 IFASC(NR$)<65ORASC(NR$)>71THEN113
116 PRINTNR$;:GOSUB600:IFNR$="E"ORNR$="B"THEN120
117 GOSUB500:GETAR$:IFAR$="3"THENNR$=NR$+"#"
118 IFAR$=""THEN117
119 PRINT"■"NR$" ";
120 READDN$,DN:IFDN$<>NI$THEN120
150 NI=DN:RESTORE
160 READDN$,DN:IFDN$<>NR$THEN160
190 NR=DN:IN=NR-NI:PRINT:PRINT"■■■■  ADJUST"ABS(IN)"SEMITONES"
200 PRINT"■■■■■■■■■■■■■■ENTER NOTE■■    ■■■■";
210 GOSUB500:GETBN$:IFBN$=""THEN210
212 IFASC(BN$)<65ORASC(BN$)>71THEN200
215 PRINTBN$;:GOSUB600:IFBN$="E"ORBN$="B"THEN250
220 GOSUB500:GETSN$:IFSN$="3"THENBN$=BN$+"#"
222 IFSN$=""THEN220
225 PRINT"■"BN$" ";
250 RESTORE
260 READDN$,DN:IFDN$<>BN$THEN260
280 TN=DN+IN:IFTN>12THENTN=TN-12
285 IFTN<1THENTN=TN+12
290 RESTORE
300 READDN$,DN:IFDN<>TNTHEN300
350 PRINT:PRINT"■■ NEW NOTE   ■"DN$" ":POKE198,0
360 GOSUB600:GOSUB600:WAIT198,1:GOTO200
500 PRINT"■■ ■ ■■■",:RETURN
600 FORT=0TO500:NEXT:RETURN
READY.
```

Music Transposer
by Andy Horrell

Sonata

on Spectrum

It seems to me that there is an absence of music programs being published, probably due to lack of musical knowledge on the part of the programmers. I have therefore written this program for the ZX Spectrum which, when *Run*, will play the first movement of Mozart's Sonata in C Major. It also demonstrates how the *Beep* command can be used effectively even with the limited sound-producing capabilities of the Spectrum.

Program notes:

30 to 230	Subroutines.
240 to 520	*Data* statements containing pitch of notes
1000	Set up variables for note duration
1010 to 2070	Main program consisting of *For-Next* loops

I have placed the subroutines near the beginning in order to speed up the running of the program. For best results it is handy to have a sound amplifier. Take care when entering the Data statements, otherwise the results may be disastrous.

```
  10 REM SONATE By C-Y Choy
  20 GO TO 1000
  30 READ B,C,D
  40 BEEP 2*X,B  BEEP X,C  BEEP
X,D  RETURN
  50 FOR N=1 TO 16
  60 READ B  BEEP Z,B
  70 NEXT N  RETURN
  [illegible]
  90 READ B  BEEP Y,B
 100 NEXT N
 110 BEEP X,14  BEEP X,19  BEEP
X,7  PAUSE 25
 120 RETURN
 130 READ B,C,D,E,F
 140 BEEP 2*X,B  BEEP Z,C  BEEP
Y+Z,E  BEEP Z,E  BEEP  ,Z  RET
URN
 150 FOR N=1 TO 12
 160 READ B  BEEP Z,B
 170 NEXT N  RETURN
 180 BEEP X,19
 190 FOR N=1 TO 12
 200 READ B  BEEP Z,B-12
 210 NEXT N  RETURN
 220 READ B,C,D
 230 BEEP 2*X,B+5  BEEP X,C+5  B
EEP X,D+5  RETURN
 240 DATA 12,16,19,11,12,14,12
 250 DATA 21,19,24
 260 DATA 9,11,12,14,16,17,19,21
,19,17,16,14,12,11,9
 270 DATA 7,9,11,12,14,16,17,19,
17,16,14,12,11,9,7
 280 DATA 5,7,9,11,12,14,16,17,1
6,14,12,11,9,7,5
 290 DATA 4,5,7,9,11,12,14,16,14
,12,11,9,7,5,4
 300 DATA 2,4,5,7,9,11,13,14,9,1
1,13,14,16,17,19
 310 DATA 21,23,24,23,21,19,17,1
6,17,19,21,19,17,16,14,12
 320 DATA 11,19,16,12,14,19,16,1
4
 330 DATA 26,23,19,21,23,21,19,2
1,19,21,19,18,19
 340 DATA 26,-1,2,7,11,26,23,19,
16,0,4,7,19,16,19,16
 350 DATA 24,-3,0,6,9,24,21,18,1
4,-1,2,6,11,14,18,14
 360 DATA 23,-5,-1,4,7,23,19,16,
12,-3,0,4,9,12,16,12
 370 DATA 21,-6,-3,2,6,21,18,14,
11,-5,-1,2,7,10,14,11
 380 DATA 9,11,12,15,16
 390 DATA 19,14,19,23,26,23,19,2
3,24,21,18,21
 400 DATA 19,14,19,22,26,22,19,2
2,24,21,18,21
 410 DATA 7,-17,-15,-14,-12,-10,
-8,-6,-5,19,22,21,19,17,16,14
 420 DATA 1[illegible],15,-13,-11,-10,-8,
-6,-4,-1,25,28,28,25,22,21,16
 430 DATA [illegible],4,5,7,9,11,13,14,
2,5,4,2,0,-1,[illegible]
 440 DATA -1,11,12,16,16,18,20,2
1,23,-4,-1,-3,-1,-2,-8,-10
 450 DATA -12,21,26,26,24,23,21,
19,1[illegible],4,2,0
 460 DATA [illegible]
 470 DATA [illegible],17,24,23,21,19,17,1
[illegible],14,-1,5,4,2,0,-1,-3
 480 DATA -4,16,23,21,20,17,16,1
4,12,-3,0,-1,-3,-5,-7,-8
 490 DATA -10,10,14,12,10,9,7,5,
4,5,7,9,10,12,14,16
 500 DATA 14,13,14,13,14
 510 DATA 14,2,4,5,7,9,11,13,14,
9,11,13,14,16,17,19
 520 DATA 23,23,24,26,28,26,24,2
3,21,19,17,15,14,12
1000 LET X=1/2  LET Y=X/2  LET Z
=X/4  LET A=X/8
1010 GO SUB 30
1020 READ B,C,D,E
1030 BEEP X+Y,B  BEEP Z,C  BEEP
Z,D  BEEP X,E  PAUSE 25
1040 GO SUB 30
1050 BEEP X,19
1060 FOR N=1 TO 3
1070 BEEP A,19  BEEP A,17  NEXT
N
1080 BEEP A,16  BEEP A,17  BEEP
X,16  PAUSE 25
1090 FOR N=1 TO 5
1100 READ B  BEEP Y,B
1110 FOR M=1 TO 14
1120 READ B  BEEP Z,B  NEXT M  N
EXT N
1130 GO SUB 50
1140 GO SUB 80
1150 FOR N=1 TO 2
1160 FOR M=1 TO 4
1170 IF N=1 THEN BEEP Z,1  BEEP
Z,2  GO TO 1190
1180 BEEP Z,0: BEEP Z,2
1190 NEXT M: NEXT N
1195 RESTORE 330
1200 FOR N=1 TO 2
1210 RESTORE 330
1220 READ B,C,D,E,F,G,H,I,J,K,L,
M,P
1230 BEEP Y,B  BEEP Z,C  BEEP X+
Y,D  BEEP Z,E  BEEP Z,F  BEEP Y,
G  BEEP Y,H  BEEP A,I  BEEP A,J
 BEEP A,K  BEEP A+Z,L  BEEP Z,M
 BEEP X,P  PAUSE 50
1240 NEXT N
1250 FOR N=1 TO 4
1260 GO SUB 90  NEXT N
1270 GO SUB 130
1280 BEEP Z,23  BEEP [illegible]
P A,23  BEEP [illegible]
EP A,21  BEEP [illegible]
EEP Y,24  BEEP [illegible]
1290 BEEP Y,[illegible]  BEEP [illegible]
2[illegible],26  BEEP Z,24  BEEP Z,[illegible]
EP Z,21  BEEP Z,[illegible]
1300 FOR N=1 TO 1[illegible]
1310 BEEP A,23  BEEP A,21  NEXT
N
1320 BEEP Z,19  BEEP Z,21  BEEP
X,19
1330 GO SUB 150
1340 RESTORE 390  GO SUB 150
1350 BEEP X,7  BEEP X,23  BEEP X,
19  PAUSE 25
1360 BEEP [illegible]  GO SUB 130
1370 RESTORE 400  GO SUB 150
1380 FOR N=1 TO 2
1390 GO SUB 50  NEXT N
1400 BEEP X,17
1410 RESTORE 400
1420 FOR N=1 TO 12
1430 READ B  BEEP Z,B-5  NEXT N
1440 BEEP X,14
1450 RESTORE 400
1460 FOR N=1 TO 12
1470 READ B  BEEP Z,B-12  NEXT N
1480 RESTORE 130
1490 FOR N=1 TO [illegible]
1500 GO SUB [illegible]  NEXT N
1510 RESTORE 240  GO SUB 220
1520 READ B,C,D,E
1530 BEEP X+Y,B+5  BEEP Z,C+5  B
EEP Z,D+5  BEEP X,E+5  PAUSE 25
1540 GO SUB 220
1550 BEEP X,24
1560 FOR N=1 TO 3
1570 BEEP A,24  BEEP A,22  NEXT
N
1580 BEEP A,21  BEEP A,22  BEEP
X,21  PAUSE 25
1590 FOR N=1 TO 4
1600 READ B  BEEP Y,B+5
1610 FOR M=1 TO 14
1620 READ B  BEEP Z,B+5
1630 NEXT M  NEXT N
1640 BEEP 2*X,21  PAUSE 25  BEEP
X,21
1650 BEEP 2*X,19  PAUSE 25  BEEP
X,19
1660 BEEP 2*X,17  PAUSE 25  BEEP
X,17
1670 BEEP 2*X,16  PAUSE 25  BEEP
X,16
[illegible]
1750 BEEP Z [illegible]  BEEP Z [illegible]
1760 NEXT M  NEXT N
1770 FOR N=1 TO [illegible]
1780 RESTORE 330
1790 READ B,C,D,E,F,G,H,I,J,K,L,
M,P
1800 BEEP Y,B[illegible]  BEEP [illegible]  BEE
P X+Y,D-7  BEEP Z,E-7  BEEP Z,F-
7  BEEP Y,G-7  BEEP Y,H-7  BEEP
A,I-7  BEEP A,J-7  BEEP A,K-7  B
EEP A+Z,L-7  BEEP Z,M-7  BEEP X,
P-7  PAUSE 50
1810 NEXT N
1820 FOR N=1 TO [illegible]
1830 FOR M=1 TO 16
1840 READ B  BEEP Z,B-7
1850 NEXT M  NEXT N
1860 FOR N=1 TO [illegible]
1870 FOR M=1 TO 16
1880 READ B  BEEP Z,B+5
1890 NEXT M  NEXT N
1900 RESTORE 500
1910 GO SUB 1[illegible]0
1920 BEEP 2*X,21  BEEP Z,20  BEE
P Y+Z,21  BEEP Z,20  BEEP Y+Z,21
1930 BEEP Y,19
1940 RESTORE 500
1950 FOR N=1 TO 14
1960 READ B  BEEP Z,B  NEXT N
1970 FOR N=1 TO 15
1980 BEEP A,16  BEEP A,14  NEXT
N
1990 BEEP Z,12  BEEP Z,14  BEEP
X,12
2000 RESTORE 390
2010 FOR N=1 TO 12
2020 READ B  BEEP Z,B-7  NEXT N
2030 BEEP X,12
2040 RESTORE 390
2050 FOR N=1 TO 12
2060 READ B  BEEP Z,B-14  NEXT N
2070 BEEP X,0  BEEP X,10  BEEP X
,12  PAUSE 25
```

Sonata
by Chi-Yeoung Choy

Instant Graphics

on BBC Micro

Here is a short program to demonstrate another use of the VDU 19 command. The program plots a series of expanding squares on the screen to simulate a type of hypnotic tunnel. It then continuously swops between four graphics pages to give the impression of forward movement in this tunnel, by expanding these squares. This a sneaky way of producing instantaneous graphic animation, which could only be paralleled by a machine code.

The *Envelope* command is also effectively used to make a psychedelic sound effect which works well.

Owners of 32K machines can achieve up to 15 pages of graphics by using the 15 colour display of Mode 2. This will produce a more realistic animation effect.

```
[illegible]
20 MODE2
[illegible]
   VDU19,1,0,[illegible]
[illegible]
70 C% [illegible]
[illegible]
    NEXT I%
   VDU5:GCOL0,[illegible]
140 E% = 0
150  FOR C% [illegible] TO
[illegible]
```

Instant Graphics
by Scott Basham

Digital Clock

on Spectrum

The program is written entirely in machine code, and thus it has a far better accuracy than any Basic program could manage.

Enter the program as shown. Line one should consist of 292 letters or characters, but adding more than this will not affect the running of the program. However, any fewer will cause a crash. *Run* the program once. The command

```
RANDOMIZE USR 23766
```

will start the clock at 00:00:00, and it will continue until you *Break* the program. If you wish to start the clock with a different time, *Poke* the appropriate digits into the following locations:

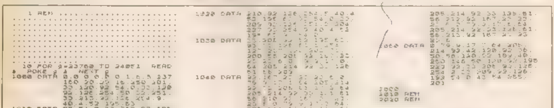
23760 Tens of hours (Remember this is a 24-hour clock.)
23761 Hours
23762 Tens of minutes
23763 Minutes
23764 Tens of seconds
23765 Seconds

Poking these locations with one, zero, three, zero, four and five, for example, would start the clock at 10:30:45.

If you want to change to a 12-hour clock, enter:

```
POKE 23850,1:POKE 24040,1
```

This will almost give a true 12-hour clock, but instead of 12 o'clock you will get zero o'clock. Otherwise the clock runs normally.



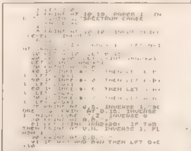
Digital Clock
by Bill Longley

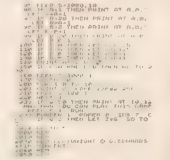
Ghost Chase

on Spectrum

This program has been devised for the 16K Spectrum. Although apparently simple to play, a degree of skill is required. We have built in [illegible] skill factor so that the player can continually upgrade his game. 1000 is the easiest, 0 the most difficult.

The player is represented by a cross; he is pursued by a ghost (graphics shifted 6). The normal cursor keys move the cross. The ghost moves at the same speed across the screen and a little slower up and down. It has the ability [illegible] cut corners so capture is inevitable. You count one point for each move prior to capture, plus ten points if the power pill (Inverse %), which may appear in random positions, is eaten before the game ends. A score of 50 or over is considered good and is rewarded.





Ghost Chase
by Tim Vincent & Gabriel Edwards

Battlestar

Battlestar is a computer moderated, play-by-mail, game devised specially for *Popular Computing Weekly* by Starlord organiser Mike Singleton.

The object of the game is to find the treasure vault on Knox II, one of the Empire's fortress planets located near the outer rim of the Milky Way. But [illegible] find the treasure vault you will have to beat 244 other players.

In order to limit numbers to a manageable size, we have devised a preliminary competition (see form alongside). But hurry, only the first 245 correct solutions will be entered into *Battlestar* proper.

The *Battlestar* entry form will be repeated in the January 27 issue of *Popular Computing Weekly*.

Entries for the *Battlestar* competition will close on January 31. The solution to the preliminary competition will be published on February 3.

Prizes

(a) The winner will receive a ZX Spectrum
(b) The four losing semi-finalists will each receive a ZX81.
(c) Each of the 245 winners of the preliminary competition will receive a voucher entitling them to £10 off a ZX Printer.

Popular Computing Weekly Battlestar

To enter *Battlestar*, all you have to do is answer the five questions below, fill in your name, address and telephone number and send the form with a SAE to *Battlestar, Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2

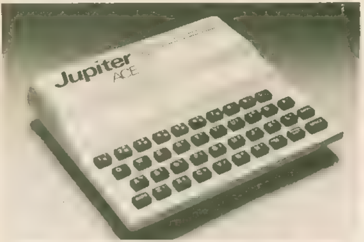
Rules

a) Each entry must be made on a form cut from *Popular Computing Weekly*
b) Only one entry per person
c) Closing date for entries is January 31.
d) The Judges' decision is final.
e) No employees of Sunshine Publications Ltd, or their families, will be eligible to enter *Battlestar*

Questions	Answers
1) Which actor played Han Solo [illegible] *Star Wars* and Deckard in *Blade Runner*?	1) Harrison Ford
2) Which film is the sequel to *Star Wars*?	2) The Empire Strikes Back is the sequel to Star wars
3) What do the letters *MCP* stand for in the film *Tron*?	3)
4) What are the names of the two robots in *Star Wars*?	4) The two robots in Star Wars are called R2-D2 & C3-PO
5) Where is *ET* trying to phone?	5) ET is trying to phone Home.

Name Simon Berry
Address 45 Rock RD
Cambridge

Tel. No 245311



Jupiter Ace revisited

***Martyn Sudworth** re-examines the Jupiter Ace and presents* Alien Swarm *— a 1K Space Invaders game.*

At first sight, the Jupiter Ace is an unimpressive plastic box strongly reminiscent of the ZX80. The Ace keyboard is a slightly improved version of the Spectrum keyboard. Both [illegible] these features betray the origin of the basic design. The Ace [illegible], however, a totally different machine from these computers by virtue of the language, Forth.

When the Ace is turned on, you will be pleasantly surprised by the dark screen which is much easier to use than a ZX81 'bright screen. The cursor is a small white pixel which can easily be changed to suit all tastes (the cursor is *Chr$* 151).

[illegible] you have just bought an Ace, after using a ZX81, then two features will strike you very quickly — it is very, very, fast and your commands do not work. Although Forth uses many commands found [illegible] Basic, the order of the command, and any numbers associated with it, are reversed. This reverse notation is awkward [illegible] use at first, but a few weeks' use will soon make you feel at home. To give an example, the Basic line.

```
FOR I = 0 TO 1000  NEXT I
```

[illegible] replaced in Forth by

```
1001 0 DO LOOP
```

Notice the fact that the *do-loop* never reaches the upper limit. The Forth equivalent is clearly shorter and on the Ace takes 0.125 seconds to run, about eight time faster than the BBC micro. A further example of speed is given by the word *Type* where:

```
100 100 TYPE
```

will print out the first 100 characters after location 100 in the Ace (equivalent to *For I = 100 To 200 : Print Chr$ (Peek (1)) : Next 1)* and takes a remarkable 0.04 seconds.

The first question asked by Basic users about the Ace is how you write programs without program lines. To understand this you must understand how to define words. Words in Forth can be commands like *Cls*, *Then* or *Print* for instance. Instead of program lines, Forth arranges these words to produce the program. For instance, if you wanted to use the equivalent of the Basic line

```
100 PRINT AT 10,20 ;  hello
```

we would define a word *Hello* as:

```
HELLO 10 20 AT .  hello
```

This has exactly the same effect. Now, if you want [illegible] write hello [illegible] the middle of the screen, you type in the word *Hello* and press *Enter*. If you want to clear the screen before printing hello, you could define a word *Clear* as:

```
CLEAR CLS HELLO
```

If you now type *Clear*, the Ace will perform the *Cls* command then the *Hello* command. Simply by extending this idea, you can build up larger and larger words (or words which do more and more) until you type in one word and the computer plays space invaders.

Word definitions start with a colon and end with a semi-colon. After the colon you must print a space, then the new word you wish to define. The use of spaces is very important in Forth as it tells the computer where one word ends and another begins.

Next, print the commands which your new word will perform — note that these commands must already be defined so that the compiler can work correctly. When your word definition is complete, a semicolon tells the Ace that you have finished.

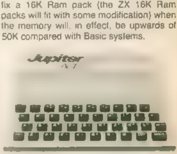
After building up a number of words, you type the master word which runs the program by calling up other words in the same way as subroutines work in Basic. This short overview gives an idea of how Forth works, but there is much more, such as the use of data stacks [illegible] store numbers which are vital to the running of the language.

Inside Ace

If you look at the memory map of the Ace, you can see that there are two copies of the television screen next to each other above the 8K Rom. The screen scroll routine (see below) uses the second copy, because this gives [illegible] steady clear display whereas manipulation of the first copy produces white dots flickering over the screen. This is presumably akin to the *Slow* and *Fast* commands on the ZX81, although the effect is not so drastic.

Above the video screen is the pad, an area for manipulating text (strings are stored temporarily in the pad to allow string arithmetic). The pad is followed by two copies of the character set memory and four copies of the dictionary and stacks. The dictionary contains the new words you have defined, the return stack contains the return addresses and the data stack contains the numbers you wish to store there for use [illegible] these words.

One [illegible] the main drawbacks of the Ace is the lack of memory for the dictionary. The problem [illegible] not as bad as on the 1K ZX81, since the Ace's memory is used far more efficiently. But advertisements for the Ace state 'The Jupiter Ace is your answer' if you have a computer and problems with your memory. This is not true unless you fix a 16K Ram pack (the ZX 16K Ram packs will fit with some modification) when the memory will, in effect, be upwards of 50K compared with Basic systems.



The manual for the Ace is good with many useful word definitions clearly laid out. A section on hardware add-ons, describing two circuits which are an interesting addition to games (one circuit gives a circuit with three LEDs which can be used to indicate fuel levels or the end of a game) is most welcome.

Alien Swarm

This program can just be fitted in the 1K of memory on the Ace. I have used some fairly long titles for some of the words, but these can be reduced to one or two letters if you want [illegible] conserve memory. However, do not use the letters *I* or *J* because these are used by the Ace as loop counters. Also, the letters *A* to *F* should not be used if you are going to work in hexadecimal, as they could then be both commands and numbers.

The listing is in two separate parts —

first the program to define the graphic characters and then the program itself. In Forth remarks are contained in brackets. These have no affect on the program and can be omitted.

A peculiarity of the Ace is that you cannot *Save* the contents of the character set memory (or rather you can not *Save* it accurately). So, I think the best alternative is to *Save* the data in a separate program.

You must first use a graphics word ■ define your characters. The manual gives a suitable word (page 71):

```
:GRAPHICS 8 * 11263 + dup 8 + do i c! -1 +loop
```

Now you must select the data to use. For this program I suggest defining words as follows:

```
: ship F0 3F 1F 0F 1F 3F F0 00 1 graphics
: ship2 00 ■ C0 FC C0 00 00 00 3 graphics;
```

Note that the data ■ in hexadecimal (base 16). A useful feature of the Ace is that you can change number bases in the middle of words by use of the square brackets which change you from immediate (ie normal) mode to defining mode (as in word definitions) and back again.

The space ship can be tested by

```
(immediate mode ) invis 1 emit 3 emit ( enter )
```

which should print out the ship as the word *Emit* is equivalent to Basic's *"Print Chr$"*. The word *Invis* stops the input line being printed onto the screen (useful for graphic games).

Other words to give different graphics are:

```
: missile 05 FF 05 00 06 ■ 06 00 4 graphics
: alien1 0E 38 70 56 70 38 0E 00 5 graphics
  alien2 18 3C 7E FF 7E 3C 18 00 2 graphics ;
```

And for the explosions:

```
  ex6 00 00 00 18 18 00 00 00 6 graphics
  ex7 00 00 18 24 24 18 00 00 7 graphics ;
: ex8 00 3C 42 42 42 42 3C 00 8 graphics
: ex9 7E 81 81 81 81 81 81 7E 9 graphics
  ex10 00 3C 42 42 42 42 3C 00 A graphics
: ex11 00 00 18 24 24 18 00 00 B graphics ;
: ex12 00 00 00 18 18 00 00 00 C graphics
```

This program should be tested, saved and verified. A word which uses all the word definitions should be written beforehand, so the program can be *Loaded* and run to *Load* the character data for the main program.

Use *Forget Graphics* after running. This last instruction makes room for the rest of the program.

The main program must be typed in the following order because the Ace will not accept words inside a word definition unless they are already ■ the Dictionary.

First you must initialise the variables:

```
1   constant y   (y co-ordinate of ship)
10  variable x   (x co-ordinate of ship)
0   variable sc  (score)
```

The game requires a random number generator. A routine is included in the Ace manual. The words *Seed*, *Seedon*, *Rnd* and *Rand* are needed.

To start the program we must reset the variables:

```
INIT 0 sc ! 10 x ! cls
```

A word to draw and erase the ship must now be written:

```
ship x @ y @ at emit 3 emit;
m x @ y @ at "   " (there are three spaces in the
quotes)
```

To allow movement, define the following words

```
up m (erase ship) x @ 1 - x!
: down m x @ 1 + x!;
: move inkey dup 101 = if up then 99 = if down then
```

The word *Move* uses the word *Up* if the *'E'* key is being pressed and the word *Down* if the *'C'* key is being pressed.

In order to make the aliens move, I have used a word which *Scrolls* the screen to the left. Some idea of the speed of Forth can be seen here in that it can perform a screen scroll without resorting to machine code

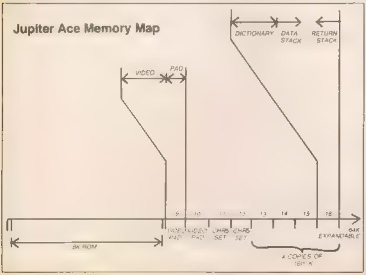
```
scr 9898 9216 do 32 4 do i j + dup c@ swap 1 - c!
 loop 32 +loop
```

To draw random aliens in the last column use;

```
■ 22 0 do i 31 at 32 rnd ?dup 0= if 2 emit else 3 =
 if 5 emit else . "  " (2 spaces) then then loop
```

Now you can set up the means of shooting at the aliens. First, you need a simple delay loop.

Jupiter
ACE


Jupiter Ace Memory Map

```
wait 100 0 do loop. (This is directly equivalent to
 Basic's;                    For I = 0 TO 99 Next I)
score sc dup @ 10 + dup rot 10 0 at  ;
bang 15388 @ 12 ■ do wait dup i swap c! loop 32
 swap c! score
: fire x @ dup 3 at 32 3 do 15388 i + c@ 32 = if 4
 emit wait dup i at "  " ( 2 spaces ) else bang leave
 then loop drop ;
```

A simple *Inkey* routine to detect if the 'K' (fire) button is being pressed;

```
?F inkey 107 = if fire then
```

Lastly, the word to actually play the game is *Go*:

```
go init 100 0 do move ship ?f LL scr ?f x @ "  " (2
 spaces ) loop
```

If you used my suggestion to use short word titles, then you might be able to fit in the word;

```
g go cls 10 10 at . " score " sc @ .
```

which ends the program by printing the score.

The game is quite simple to play. You are part of the Earth Defence Fleet when you come upon an armada of alien fighters. You have just 100 seconds (Galactic Seconds by the way) to destroy as many enemy fighters as possible.

The program is as complex as the limitations of memory allowed. The only possible way of stopping the program before the end ■ to lower your ship into the *'Input'* line (so don't do it!)

Once you have ensured the program works properly, you can use the *Fast* command which almost doubles the speed of the game. A score of 1000 is very good (my record is 1060). As the manual states, *Fast* is very dangerous as errors tend to lead to crashes, so be careful.

This program should be *Saved and Verified* after the previous graphics program. To play the game, first *Load* and Run the graphics program (to get the user-defined characters) then rub out that program and *Load* and play the game.

Possible problems

The most likely problem that will occur is missing-out/putting in a space where it should/should not be. If the Ace will not accept a word, then check to see if you have defined it (for example, it will not accept the word *Move* until *Up* and *Down* have been defined). The next most likely problem is running out of memory (until you get ■ 16K Ram pack fitted). This is caused by the dictionary being either too large (which can only be cured by *Forgeting* words) or by improperly defining a word so that it leaves unwanted numbers on the stack which will eventually fill up the memory. ■

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---

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Extending capabilities

This is the first extract from the new book, The Working Dragon 32, published by Sunshine Books Ltd. The book is a collection of subroutines built up into practical programs.

In this extract, from Chapter 5, we turn our attention to an area where the machine's performance is somewhat lacking compared with some other popular microcomputers — the mixing of text (that is letters and numbers) and high resolution graphics on the screen at the same time.

Many of you may be aware that one solution to this irritating limitation is to use the flexible *Draw* command to literally 'draw' letters on the screen in the high resolution *Pmodes*. The real disadvantage of this method is the necessity to go through the painfully slow process of building up the fairly complex strings that will be drawn and writing them into each new program which requires some text.

In the two programs which follow we shall attempt to overcome this drawback by providing a simple method of creating the desired characters, of storing them for subsequent use and of compiling them into 'character sets' for subsequent use by other programs. In other words we shall attempt to substantially extend the Dragon's capabilities.

Characters

The purpose of this program [illegible] to allow you to build up any character you wish which [illegible] capable of being fitted into an area on the screen of 32*32 pixels. The actual size of the character when printed on the screen will depend upon the *Pmode* and the scale in use when it is *Drawn*.

Module 1: *Lines 1000-1130*

The purpose of this module is to initialise the program variables and to set up an array which will be used later in the program to reduce the time taken to print a 32*32 chequerboard design by use of *Get* and *Put*.

Commentary

1030 Since we shall be working with strings we shall need to set aside more than the basic minimum of string space. The remaining commands merely set aside sufficient memory space to work in *Pmode* 1 using the first colour set.

1060-1110 These lines initialise the *Drawing* position to the top left hand corner of the screen and then *Draw* the first two lines of a chequerboard, one square at [illegible] time. You will note once again how [illegible] series of *Draw* commands placed on different lines are executed as if they were part of the same thing.

1120 The area of the screen *Drawn* upon is 128*8 pixels and this rectangle is now stored in the array C using the *Get* command. It would not be possible to store the whole 32*32 matrix in such an array since even [illegible] store only 1 16th of it requires over 5000 bytes of memory. This heavy memory demand involved in the use of *Get* is the main drawback to an otherwise useful feature of the Dragon.

Testing

The functions of the various arrays can only be checked later in the process of entering the program but at this stage the module should visibly draw the first two lines of a chequerboard on the screen and then clear the screen.

Module 2 *Lines 5000-5030*

The sole purpose of this module is to define a short string which draws an inked-in square at an appropriate position [illegible] the array as defined by the variables X and Y.

Commentary

5030 This line serves as useful reminder that the strings used to control the *Draw* command do not have to be cut and dried before running the program. All the string handling capabilities of the Dragon can be brought [illegible] bear. In this case, values for X and Y are inserted into the string using the STR$ function. The line [illegible] included as a separate one-line subroutine simply because it is called more than once in the program and it saves space if it is not spelt out in several places.

Testing

The line can be tested after the entry of the next module.

Module 3: *Lines 2500-2570*

This module places on the screen the whole 32*32 grid that will be used to define characters. When later modules have been entered it will also ink-in the squares which define a character.

Commentary

2530 Using the array C, which holds two lines of the chequerboard design, this line prints the 32*32 grid by *Putting* the contents of the array on to the screen [illegible] 16 consecutive locations. This is considerably faster than *Drawing* the grid.

2550-2570 Using two loops to increment the values of X and Y, the array A is examined to see if the array element corresponding with each element in the grid contains something other than a zero. [illegible] it does, then Module 2 is called up and the current values of X and Y incorporated into D$, which then *Draws* an inked-in square at the appropriate point.

Testing

The program should now [illegible] capable of placing the 32*32 element grid on the screen, then stopping with the '*Return without Gosub*' error. If you wish, you can feed some ones into the array A in direct mode, then *Goto* 2500. The corresponding squares on the grid should have been inked-in. Note that it takes time to examine the whole array — some 20 seconds — so that a pause does not mean that the program is malfunctioning. ■

***The Working Dragon 32,** by David Lawrence, costs £5.95 and will shortly be available from **Sunshine Books Ltd.**, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF*

Module 1

```
1000 REM***************************
1010 REM INITIALISE
1020 REM***************************
1030 PMODE0,1 PCLEAR 2 CLEAR 1000 PMODE 1,1 SCREEN 1,0 PCLS4
1040 DIM A(31,31) DIM B(31,31)
1050 DIM C(127,7)
1060 DRAW "BM0,0"
1070 FOR I=1 TO 2
1080 FOR J=1 TO 16 DRAW "C1,R3,BR1 [illegible] R3 BR1" NEXT J
1090 DRAW "BM-128,+2" NEXT I
1100 FOR I=1 TO 2 FOR J=1 TO 16 DRAW "C2,R3,BR1,C1,R3,BR1" NEXT J
1110 DRAW "BM-128,+2" NEXT I
1120 GET (0,0)-(127,7),C
1130 PCLS4
```

Module 2

```
5000 REM***************************
5010 REM FUNCTIONAL SUBROUTINES
5020 REM***************************
5030 LET D$="BM"+STR$(X)+","+STR$(Y)+";"+"D3,R1,U3 R1,D3,R1,
     U3" RETURN
```

Module 3

```
2500 REM***************************
2510 REM DRAW GRID
2520 REM***************************
2530 PCLS2 FOR I=0 TO 120 STEP 8 PUT (0,I)-(127,I+7),C NEXT I
2540 DRAW "C1,BM128,0 D128,L128"
2550 FOR Y=0 TO 124 STEP 4 FOR X=0 TO 124 STEP 4
2560 IF A(Y/4,X/4)<>0 THEN GOSUB 5330 DRAW "C0;"+D$
2570 NEXT X,Y LET X=0 LET Y=0 RETURN
```

Now we our sails advance

Nick Wilson reveals a hidden function of the Spectrum's draw command.

The draw command on the Spectrum has, so the manual informs us, two main functions:

1) To draw a line from A to B
2) To draw an arc from A to B

The first program, *Line Drawer* demonstrates the draw command. If the program is broken into after several seconds' running, it produces figure 1. *Arc Drawer* produces a similar effect, but this time a random-lengthed arc has been projected from the centre of the screen.

Super Drawer, however, illustrates a hidden function of draw! I discovered this function quite by accident, by mis-typing and putting a four-figure number as the third parameter of the draw command — which produced a large thick circle.

I decided to experiment, and found that some very interesting patterns and circles could be produced at very high speed! The effect could only be produced 50 per cent of the time, as the entered number sometimes caused the line to be drawn off the screen, giving an error.

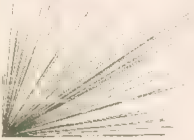
I have written a short program which chooses a random number and then draws a pattern accordingly. The error factor persists, but just type Run and Enter, and a new pattern whizzes up in front of you.

Drawer Mk. 2 invites you to type in a number. The computer then draws the resulting shape. Try typing in some of the numbers from the examples.

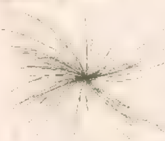
I have tried to work out a formula to detect when a line will be drawn off the screen — so far without success. Perhaps someone else can come up with the answer?

Remember, you cannot break into the program when it is running because the computer does not check the keyboard while it is drawing. ■

```
L I N E   D R A W E R
 2
 3 REM ++++++++++++++++++++
 4 REM +++ LINE  DRAWER  +++
 [illegible]
```



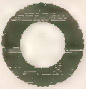
```
A R C   D R A W E R
 2
 3 REM ++++++++++++++++++++
 4 REM +++  ARC [illegible]
 [illegible]
 7 REM +++       1982     +++
 8 REM ++++++++++++++++++++
 9
10 [illegible]
[illegible]
30 GO TO 10
```



```
S U P E R   D R A W E R
 2
 3 REM ++++++++++++++++++++
 4 REM +++ SUPER DRAWER  +++
 5 REM [illegible]
 6 REM +++ (C) COPYRIGHT  +++
 7 REM +++      1982      +++
 8 REM ++++++++++++++++++++
 9
10 [illegible]
20 PRINT AT 0,0;a
30 PLOT 50,50: [illegible]
```

```
D R A W E R   M K . 2
 2
 3 REM ++++++++++++++++++++
 4 REM +++ DRAWER  MK.2  +++
 [illegible]
 7 REM +++      1982     +++
 8 REM ++++++++++++++++++++
 9
10 [illegible]
20 [illegible]
30 PLOT 50,50: DRAW 50,50,[illegible]
```

50186.157



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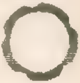

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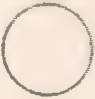

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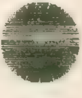

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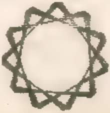

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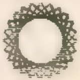

SHIFTING IN AND OUT AGAIN

Yu Ting Man of Wellington Street, Kettering, Northants, writes:

A I have just purchased a Seikosha GP-100 printer for my BBC model B. The printer's manual says that it can print double size characters, under software control, and also graphics. I do not know how to do these, because I do not understand the explanation of the commands from the manual. I would be very grateful if you could help me on this.

A You call the double size character routine by sending the appropriate code to the printer. In this case you want the Ascii code for *Shift In* which is 14. So you need the command *VDU 1,14*. To go back to normal printing you have to use the Ascii code for *Shift Out* which is 15. So the command is *VDU 1,15*.

The subject was covered by *Beebug* in their July 1982 issue. I suggest that you write to them at Dept 1, 374 Wandsworth Road, London SW8 4TE, for a back copy which will cost you 80p plus SAE.

2K RAM CHIP ADDS TO MEMORY

F Chilten of Nicholls Field, Harlow, Essex, writes:

Q After using my firm's AIM 65 I decided to buy myself a ZX81. I am very pleased with it, but I would be grateful for a little help.

Is it possible to find out how much memory you have used, or how much you have left, while entering a program? Also, I have seen some 2K Ram chips for sale which, purportedly, give three to four times more memory. Could you explain this? I would like to fit a 2K chip, and then later a 16K Ram pack, could I do this, and how much memory would I then have?

A Yes, it is possible to find out how much memory you have used or have left. To find out how much space a program takes up, use:

```
PRINT PEEK 16395 + 256 * PEEK
  16397 – 16509
```

To find how much you have left use:

```
PRINT PEEK 16386 – PEEK 16412 +
  256 * (PEEK 16387 – PEEK 16413)
  – 50
```

I do not quite see how a 2K Ram chip will give you three to four times more memory. A 2K Ram chip will give you just that, 2K Ram. But a greater proportion of the memory will be available because the ZX81 will always use 125 bytes for variables.

As for adding a 16K Ram pack later, as long as you do not actually damage the bus lines of the port when you put in your 2K chip, then you would have 18K of memory available. A 6116 2K chip, is the standard memory on the American version of the ZX81 (Timex 1000) and there have been no particular problems with adding a 16K Ram pack to these machines

MODIFICATIONS TO AMPLIFY

D Hartley of Towers Way, Leeds, West Yorkshire, writes:

Q How can I connect the speaker from an old radio to my Spectrum?

A I am not quite sure why you want to do this, though I would guess that you want to amplify the sound made by your onboard speaker. Amplify is the important word, because a larger speaker alone will not make the sound any louder. If you really want to make the sound louder then all I can suggest by way of a physical modification is that you take the speaker out and use longer leads going into your computer.

On some cassette players you can play the beep straight back through the recorder using the Mic lead and the normal volume control. Plug in the Mic lead from the computer to the cassette and, with no tape in the recorder, press the play button and turn up the sound (on some players you must press the record button).

PUZZLED NO MORE

Steve Hill of Windsor Road, Ilford, Essex, writes:

Q In the Spectrum manual on page 185, are three *ED* prefixes that are puzzling me. The instruction in f,(c) was not available on the ZX81 and I cannot find it in any manual of machine code for the Z80.

The two instructions, ld (NN), hl and ld hl (NN) — codes 99 and 107 — seem to be duplicates of the un-prefixed instructions 34 and 42. The only information that I can get from Sinclair is the distinctly unhelpful comment, 'These are not printing errors'. Can you explain what has happened?

A Interesting indeed. The instruction f,(c) inputs into the flag register, and I can only assume that it is not listed because it was thought unnecessary. I have not been able to find it noted anywhere else

If you load *BC* with 65278 (which is part of the keyboard routine), push *AF* pop *HL* and in f(c) then push *AF* again followed by pop *DE* then the before and after results should appear in *H* and *D*

The other two instructions would appear to be doing the same thing in two different ways, with 34 and 42 being shorter. It is nice to see a more thorough than usual list of instructions in a manual and I hope that other manufacturers take note. In situations like this last one, duplicated instructions are often left out, and only the shorter version is listed. I can see no reason to use the longer version in this case

SUBTITLING ON VIDEO FILMS

Colin Hammerstone of Beavers Park, Coventry, writes:

Q I would like to know whether it is possible to record sub-titles, that I have entered on my computer, on to some home movies that I have on video?

A Yes it is possible, but it is not the easiest of things to do. You do not say what computer you have but the general principles are the same for all

What you need is a video mixing console. This is a piece of circuitry that will allow you to mix two video signals — one from your movie and one from your computer. It works by taking the two signals, overlaying the one for the screen with the one for the titles, and sending the mixed signal to the modulator for displaying on your television set.

I do not know of any commercially available machines for this, though I believe that there have been some units designed by amateurs that work quite well with specific computers.

CONVERSION BY DIGITAL TRACER

Louise Harvey of Stockton-on-Tees, writes:

Q I have got a Spectrum and I am quite pleased with it. My main interest is drawing such things as maps and diagrams. I have been told that there is a machine which will convert a drawing to a computer picture by just following the outline with a special pen. Is this true? If so, how much will it cost? I know things like this are available for big computers, but what about the Spectrum?

A You are correct. This is not the sort of thing that one would automatically expect to be available for a home computer, but I think you have in mind the 'RD Digital Tracer'. It can be used to trace an image, which can then be stored in the display file, on tape, or transferred to a printer. It can also be used with the ZX81, though without the colour and high-res graphics.

The Digital Tracer costs £49.95 and is available from RD Laboratories, 5 Kennedy Road, Dane End, Ware, Herts SG12.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW,* Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

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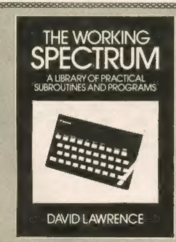
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